3. POTENTIAL STATIONS

The Red Line Extension to Bayview Feasibility Study has identified four potential transit station areas based on a variety of factors including; Community Demographics (provided in Appendix A), proximity to the Interstate system, transit system connectivity, and community and stakeholder feedback as provided through the Red Line Study meetings as well as specific Bayview Study meetings. It should be noted that the recommended alternative will only include two or three of these stations for the length of the alignment in the study area. Figure 3.30 shows these station areas.

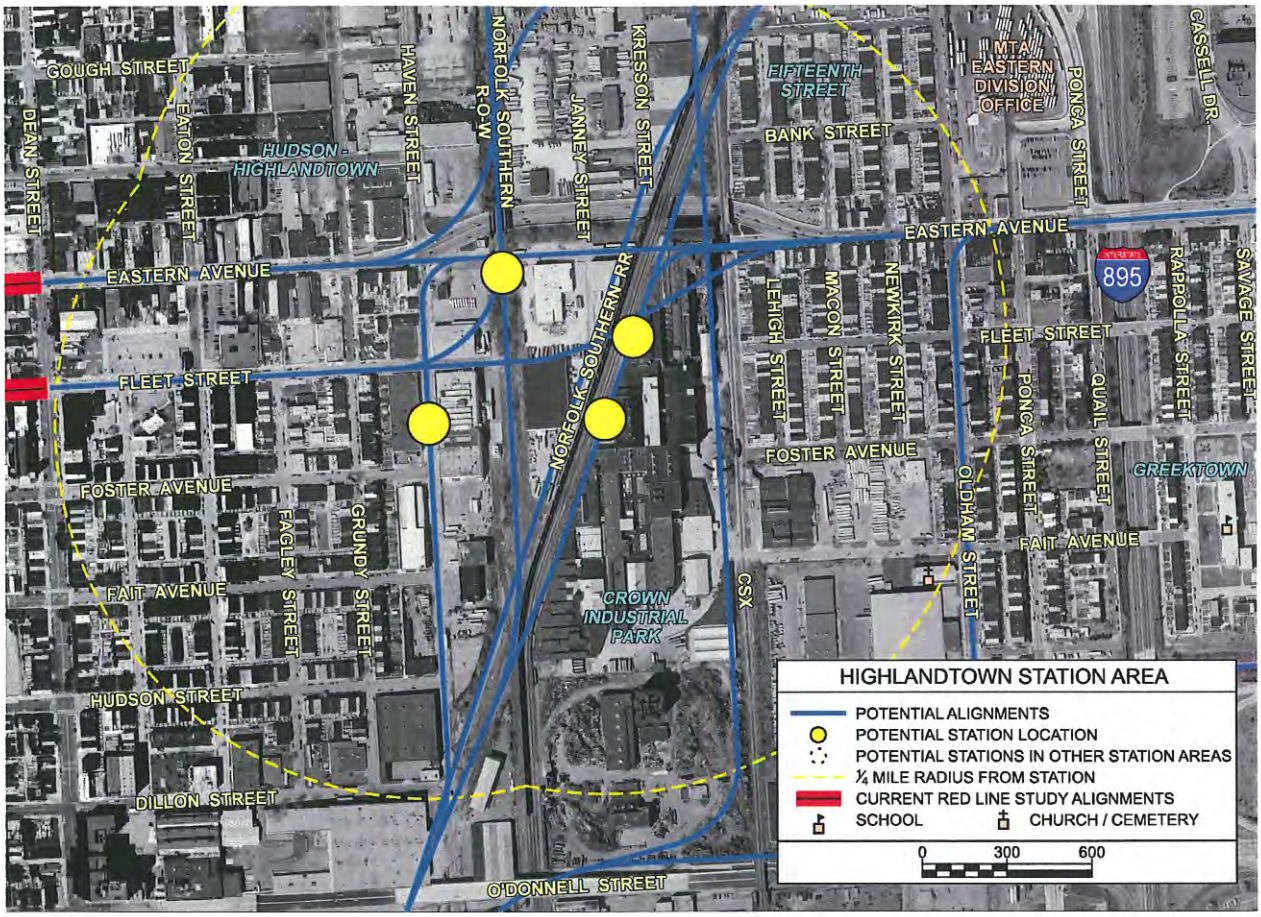
1. Highlandtown
2. Greektown
3. Bayview MARC
4. Bayview (Medical Center or South)

These station areas are described in further detail below.

1. Highlandtown

The Highlandtown Station area, shown in Figure 3.31, is located between Haven Street on the west and the abandoned Norfolk-Southern Railroad right-of-way on the east. Eastern Avenue borders on the north whereas Foster Avenue lies to the south of this station area.

Figure 3.31: HIGHLANDTOWN STATION AREA



Highlandtown is one of the potential stations for several alignments identified in the study. These include the following:

- Greektown Alignment
- Haven Alignment
- Crown West Alignment
- Central Alignment from Boston Street
- Lombard Alignment from Boston Street
- Kresson A Alignment from Boston Street
- Kresson B Alignment from Boston Street
- Kresson C Alignment from Boston Street
- Northern Alignment from Boston Street

Since this station area lies south of the Eastern Avenue - Fleet Street, the alignments that originate from Eastern-Fleet do not have a station at Highlandtown.

The land uses around the station area are a mix of industrial, commercial and residential. This station area is in close proximity to the Crown Industrial area. The City of Baltimore has identified the potential of Crown Industrial Area for redevelopment. Other major commercial redevelopment projects on Eastern Avenue include the Market at Highlandtown and Walgreen's. In addition, there are future plans to redevelop a vacant lot north of the Walgreen's property. Highlandtown's commercial district lies to the west of this station area. This station will serve Highlandtown, Baltimore Highlands and Hudson neighborhoods.

Eastern Avenue has sidewalks on both sides of the road and these are used by both pedestrians and bicyclists. The east - west vehicular movements between Greektown and Highlandtown are restricted to Eastern Avenue, Lombard Street and O'Donnell Street.

New Walgreen's redevelopment at Eastern Avenue / Haven Street

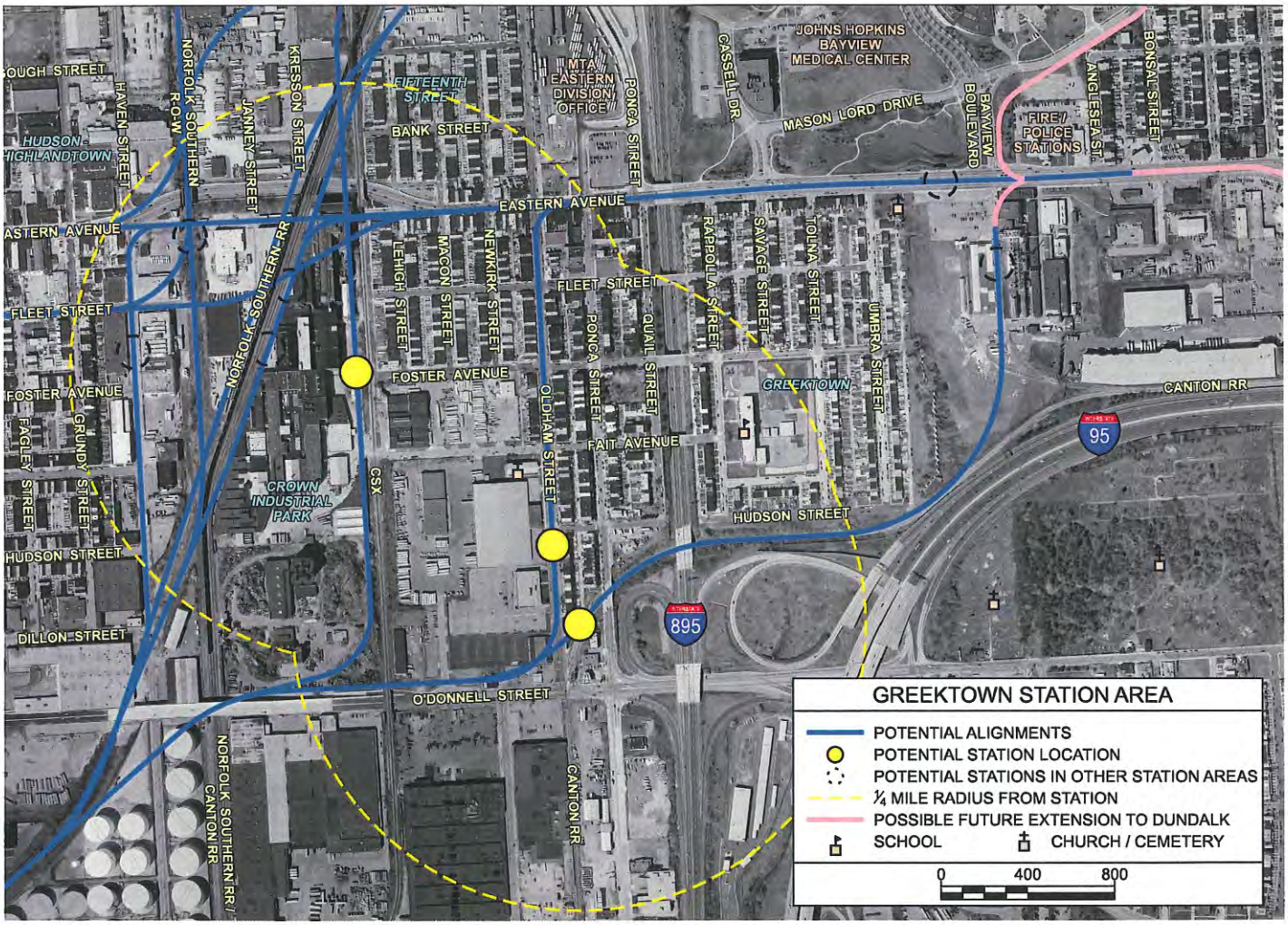
Highlandtown: Rowhouses on Grundy Street – two blocks south of Eastern Avenue

There are three existing bus stops within the station areas. Westbound stops are located at the northeast quadrant of Eastern Avenue and Eaton Street and the northwest quadrant of Eastern Avenue and Grundy Street. The eastbound stop is located at the southwest quadrant of Eastern Avenue and Eaton Street. The bus lines serving these areas include 2/10 and 22.

2. Greektown

The Greektown Station area, shown in Figure 3.32, is located between Oldham Street on the east and the CSX Railroad right-of-way on the west. Eastern Avenue borders on the north whereas O'Donnell Street lies to the south of this station area.

Figure 3.32: GREEKTOWN STATION AREA



Greektown is one of the potential stations for three of the twenty alignments identified in the study. These include the following:

- Pemco Alignment
- Oldham Alignment
- Crown East Alignment

Since this station area lies south of the Eastern Avenue - Fleet Street, the alignments that originate from Eastern-Fleet do not have a station at Greektown.

The land uses around the station area are a mix of industrial, commercial and residential. There are three potential station locations in the Greektown station area. One of these potential stations (Crown East Alignment) is located on the abandoned CSX right-of-way. This station is located adjacent to the Crown Industrial Park which has been identified by the City as having redevelopment potential. South of the Crown Industrial Park is Cambridge Iron and Metal and vacant warehouse and distribution industries. The other two potential station locations are not close enough to the Crown Industrial Park to allow for joint redevelopment opportunities. However, all the stations are located near the proposed Greektown Hale-KSI development project. This co-location with the proposed project provides for redevelopment opportunities for all three alignments. Greektown's commercial district is located on Eastern Avenue, just north of the station area. Greektown station area will serve Greektown and Fifteenth Street residential neighborhoods.

Greektown: Rowhouses on Oldham Street – three blocks south of Eastern Avenue.

Crown Industrial Park

There are three existing bus stops within the station areas. The westbound stop is located at the northeast quadrant of Eastern Avenue and Ponca Street. The eastbound stop is located at the southeast quadrant of Eastern Avenue and Ponca Street. A third bus stop is located on southbound Ponca Street, north of Eastern Avenue. The bus lines serving these areas include 2/10, 20 and 22.

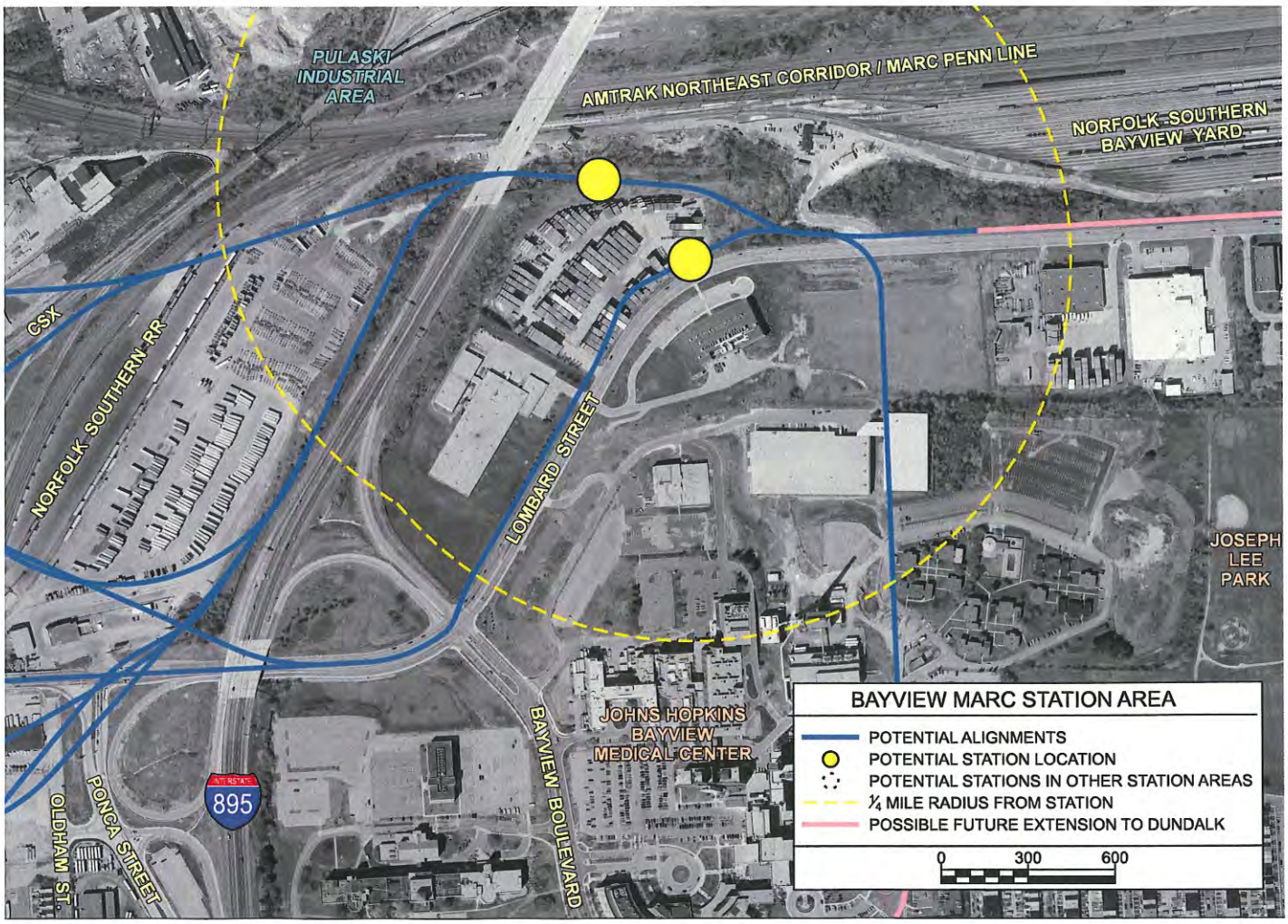
3. Bayview MARC

MARC has a planned East Baltimore station along Lombard Street immediately north of the Johns Hopkins Bayview Medical Center. The Bayview Feasibility Study station area, shown in Figure 3.33, near the MARC Station will be referred to as Bayview MARC station. The Bayview MARC station area is located on Lombard Street directly north of Johns Hopkins Bayview Medical Center and adjacent to the Norfolk Southern rail yard near the I-895 interstate.

Since connection to the MARC station was an important criterion in the assessment of the alternatives, a large number of alternatives have a station at Bayview MARC. These include the following:

- Crown East Alignment
- Crown West Alignment
- Canton Railroad Alignment
- Central Alignment (from Boston Street)
- Lombard Alignment (from Boston Street)
- Kresson A Alignment (from Boston Street)
- Kresson B Alignment (from Boston Street)
- Kresson C Alignment (from Boston Street)
- Northern Alignment (from Boston Street)
- Central Alignment (from Eastern-Fleet)
- Lombard Alignment (from Eastern-Fleet)
- Kresson A Alignment (from Eastern-Fleet)
- Kresson B Alignment (from Eastern-Fleet)
- Kresson C Alignment (from Eastern-Fleet)
- Northern Alignment (from Eastern-Fleet)

Figure 3.33: BAYVIEW MARC STATION AREA



The areas north and west of the station areas are restricted by rail and vehicular transportation facilities. South of the station areas is the Johns Hopkins Bayview Medical Center. The station areas will primarily serve staff and patients of the Medical Center and numerous affiliated biomedical industries along Lombard Street. The station areas will offer opportunities for a commuter park-and-ride facility. A conceptual layout of the park-and-ride is provided in Appendix A, Page 104.

John Hopkins Bayview Medical Center from Lombard Street

Lombard Street: looking west from entrance of John Hopkins Bayview Medical Center

There are two existing bus stops within the station areas. Both east bound and westbound stops are located on Lombard Street, west of the new entrance to the Johns Hopkins Bayview Medical Center. The bus lines serving this area include 23 and 40.

4. Bayview Station Area

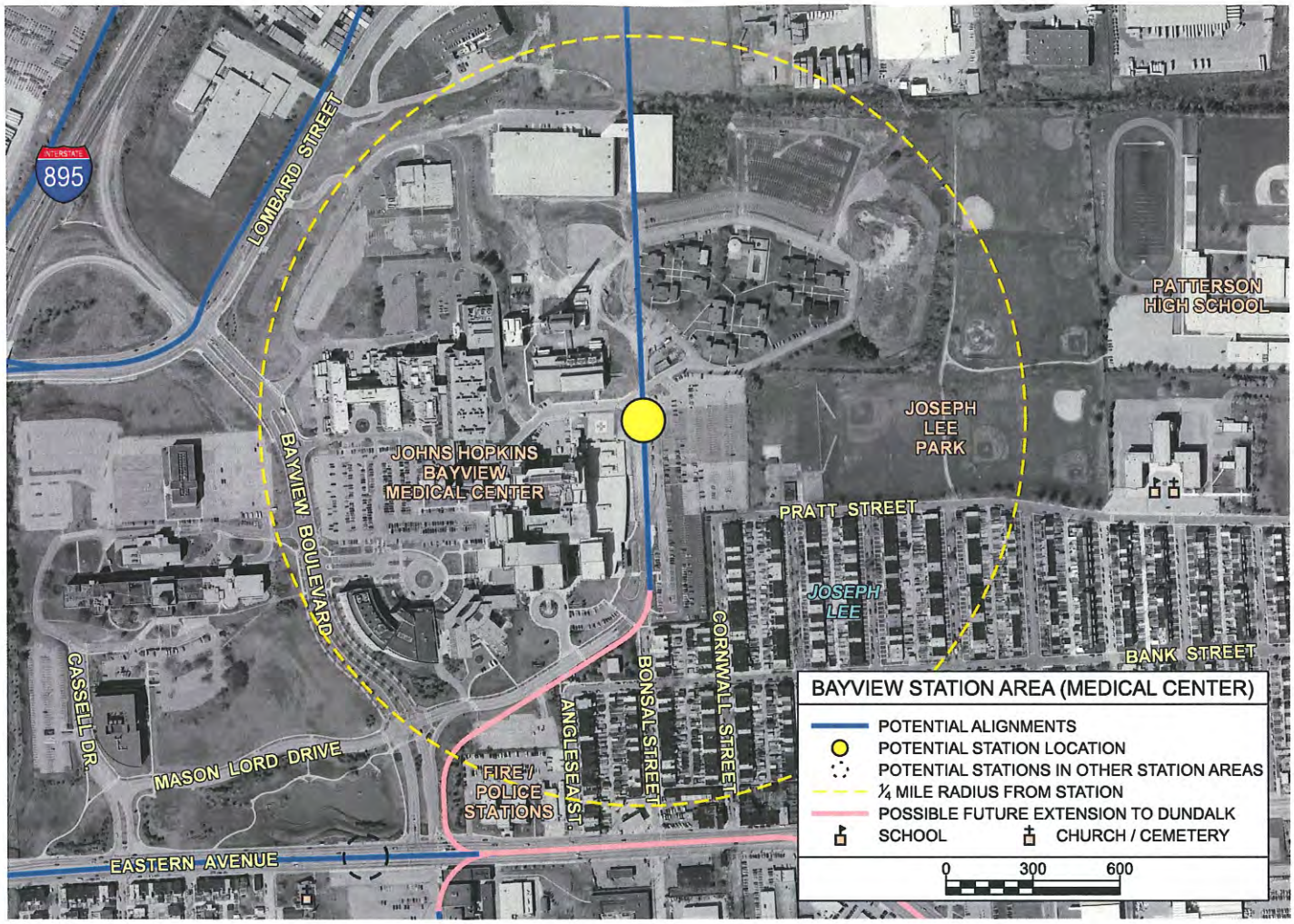
a. Medical Center

The Bayview Station (Medical Center) area, shown in Figure 3.34, is located in the Johns Hopkins Bayview Medical Center, on Mason Lord Drive. Bayview Station (Medical Center) is one of the potential stations for several alignments identified in the study. These include the following:

- Crown East Alignment
- Crown West Alignment
- Canton Railroad Alignment
- Central Alignment (from Boston Street)
- Lombard Alignment (from Boston Street)
- Kresson A Alignment (from Boston Street)
- Kresson B Alignment (from Boston Street)
- Northern Alignment (from Boston Street)
- Central Alignment (from Eastern-Fleet)
- Lombard Alignment (from Eastern-Fleet)
- Kresson A Alignment (from Eastern-Fleet)
- Kresson B Alignment (from Eastern-Fleet)
- Northern Alignment (from Eastern-Fleet)

Currently, Mason Lord Drive extends from Eastern Avenue up to Nathan Shock Drive. It is proposed that Mason Lord Drive be extended to connect with Lombard Street in the north, see Figure 2.2 for the 'Johns Hopkins Bayview Campus - Buildout Plan'. The existing and proposed uses are primarily institutional with residential areas located on the southeast of the station location. Adjacent to the campus on the east side is the Joseph Lee Community Park with baseball fields, basketball courts, a wading pool, and a children's playground. North of the station area are a vacant professional residence and a surface parking lot that are planned for redevelopment.

Figure 3.34: BAYVIEW STATION AREA (MEDICAL CENTER)



The station area will primarily serve staff and patients of the Medical Center and residents of Bayview. Bus stops within the station area are provided near the Emergency entrance and south of the Medical Offices entrance. The bus line serving this area is the 22.

John Hopkins Bayview Medical Center: Looking south down Mason Lord Drive

John Hopkins Bayview Campus: between parking garage and medical center

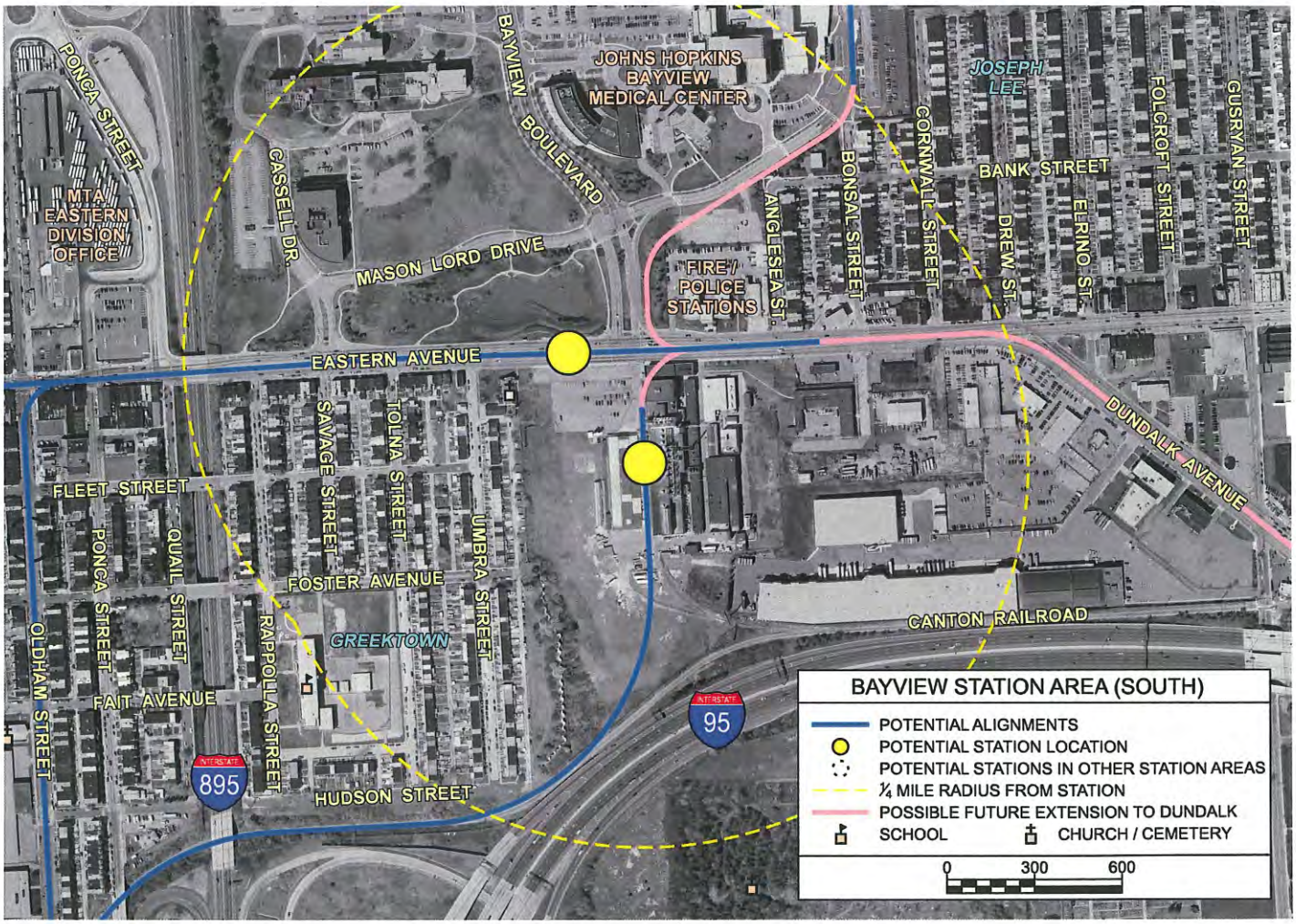
b. South

The Bayview Station (South) area, shown in Figure 3.35, is located at the main entrance to Johns Hopkins Bayview Medical Center on Eastern Avenue, west of Bayview Boulevard and within the Pemco International property, south of Eastern Avenue.

Bayview Station (South) is one of the potential stations for the following alignments identified in the study.

- Pemco Alignment
- Oldham Alignment
- Greektown Alignment
- Haven Alignment
- Eastern-Fleet Alignment

Figure 3.35: BAYVIEW STATION AREA (SOUTH)



The land uses around the station area are a mix of institutional, residential and industrial. The Johns Hopkins Bayview Medical Center lies to the north of the station area. The residential neighborhoods of Joseph Lee and Greektown lie respectively to the east and west of the station area. The Pemco International property lies to the south of the Bayview (South) station area. The City of Baltimore has identified this property as having redevelopment potential for new industrial uses, particularly because of its rail spur and proximity to Interstates 95 and 895. High intensity industrial zoned land has become a premium in Baltimore City. Since locating a station on this property could impact the site's industrial redevelopment potential, and the station at the Pemco site is an option only with the Pemco Alignment, it is recommended that both the alignment and station be excluded from further consideration. The land uses along Eastern Avenue, to the east of the station area, primarily consist of gas stations and auto repair. Directly north of the station area, along the north side of Eastern Avenue are the offices of the Baltimore Southeast District Police Department and the Baltimore City Fire Department. This station will serve the Johns Hopkins Bayview Medical Center and the Joseph Lee residential neighborhood.

Joseph Lee: Rowhouses on Umbra Street – south of Eastern Avenue

Fire Department on Anglesea Street

There are four existing bus stops within the station areas. The westbound stops are located at the northeast quadrant of Eastern Avenue and Anglesea Street and west of Bayview Boulevard. Eastbound stations are located across the street from westbound stations. The bus lines serving this area include 2/10, 22, 23 and 40.

4. EVALUATION

The Bayview Feasibility Study identified a total of 20 alignment alternatives. These alignments were described in Section 2 titled 'Alignment Alternatives.' The previous descriptions aimed to discuss the opportunities and constraints of each alignment with respect to certain evaluation criteria. This section presents a comparative analysis of these alignments on the basis of the same evaluation criteria plus the following:

- Parking for Commuters
- Capital Costs
- Estimated Travel Time

An alignment was rated 'very favorable', 'favorable', 'neutral', 'unfavorable' or 'very unfavorable'. These results are depicted by circles wherein a filled-in circle represents the 'very favorable' and the hollow circle represents 'very unfavorable' alternative with regards to that evaluation criterion. The Evaluation Matrix presents the results of the evaluation process. Composite Evaluation is the last column in the Evaluation Matrix summarizing the number of evaluation criteria against which an alternative scored a 'very favorable', 'favorable', 'neutral', 'unfavorable' and 'very unfavorable'.

ALIGNMENT ALTERNATIVES EVALUATION MATRIX

DESCRIPTION OF ALIGNMENTS			ISSUES, OPPORTUNITIES AND IMPACTS													
Alignment Name	**Length (in feet)**	**Stations**	**Access to Bayview**	**Connection to MARC**	**Parking for Commuters**	**Capital Costs ($ millions)**	**Estimated Travel Time**	**Property Impacts**	**Economic Development/City & BDC Plans**	**Compatibility with Rail Freight Operations**	**Parking & Residences**	**Business Operations**	**Traffic**	**Environmental Impacts/Constraints**	**Constructability**	**Composite Evaluation**
Boston Street – Eastern Avenue Group																
Pemco Alignment	6640	Greektown, Bayview	◐ 0.25 mile walk or a shuttle required	○ Not provided	○ Not provided	● $136.3	◔ 3:35	◴ 4 homes, gas station, UAW hall, businesses east of Oldham Street.	○ Conflicts with Industrial redevelopment	○ Impacts Pemco's access to freight	● None	● None	● Grade crossing at Oldham and Ponca Streets	○ Very High Contamination Concerns	○ Pile-supported piers at the O'Donnell Street Viaduct and the need for a second short tunnel under the CSXT right-of-way present construction challenges	4 1 1 1 6 ● ◔ ◐ ◔ ○
Oldham Alignment	7810	Greektown, Bayview	◐ 0.25 mile walk or a shuttle required	○ Not provided	○ Not provided	● $141.2	◴ 6:13	◴ 4 homes, gas station, UAW hall, several businesses on the southeast corner of Oldham Street & Eastern Avenue.	○ Conflicts with Industrial redevelopment	◐ May impact Pemco's access to freight	◐ Along Oldham & Eastern	◐ Along Oldham & Eastern	◐ Transit at grade on Oldham & Eastern	○ Very High Contamination Concerns	○ Reconstruction of Ponca St & 895 overhead bridges. Pile-supported piers at the O'Donnell Street Viaduct and the need for a second short tunnel under the CSXT right-of-way present challenges	1 0 5 2 5 ● ◔ ◐ ◔ ○
Greektown Alignment	7360	Highlandtown, Bayview	◐ 0.25 mile walk or a shuttle required	○ Not provided	○ Not provided	● $119.6	◐ 4:34	◐ Acquisition & demolition of buildings in Crown Ind'l Park & on the northernmost end of park. CSXT bridge replacement.	○ Conflicts with Industrial redevelopment	◐ May impact Pemco's access to freight	◴ Along Eastern	◴ Along Eastern	◴ Transit at grade b/w Macon & Ponca on Eastern Avenue	◔ Contamination Concerns - Low	◴ Requires reconstruction of the existing bridge carrying CSXT's track	1 1 4 4 3 ● ◔ ◐ ◔ ○
Haven Alignment	8010	Highlandtown, Bayview	◐ 0.25 mile walk or a shuttle required	○ Not provided	○ Not provided	● $160.8	◐ 4:04	◐ Southeast corner of Haven & Eastern Avenue	○ Conflicts with Industrial redevelopment	◐ May impact Pemco's access to freight	◔ Along Haven	◔ Along Haven	● Low Impact - Transit at grade in Haven Street	○ Very High Contamination Concerns	○ Requires the construction of a railroad bridge to carry the inactive NS tracks and ROW over the transitway. The approaches to both ends of the tunnel will require grades of 8.0%	0 4 4 0 5 ● ◔ ◐ ◔ ○
Boston Street – East Baltimore MARC Station Group																
Crown East Alignment	12370	Greektown, MARC & Bayview	● Very Good	● Very Good	● At MARC	◐ $234.4	◴ 5:47	◐ ROW required to cross the Cambridge Iron & Metal and Crown Industrial Park (CIP), building demolition on the CIP property. Businesses west of NS ROW north of Eastern & a Trucking Co. property at Lombard & Oldham, ROW required at SE corner of the NS intermodal facility north of Lombard and west of I-895.	◐ Redevelopment opportunities at Greektown	◐ NA, but coordination with MTA required	◔ Low	◔ Low	◔ Low Impact - Grade crossing at Eastern Avenue	◔ Contamination Concerns - Low	● Good. The aerial structure over the Canton and NS Railroads ROW and the O'Donnell Street Viaduct offers the advantages of flatter grades and avoidance of the pilings.	4 4 4 1 0 ● ◔ ◐ ◔ ○
Crown West Alignment	11600	Highlandtown, MARC & Bayview	● Very Good	● Very Good	● At MARC	○ $305.6	◴ 5:58	● None	◐ At Crown Industrial Park	◐ NA, but coordination with MTA required	◔ None	◔ None	◔ Low Impact - Grade crossing at Lombard and Ponca Streets	○ Contamination Concerns - Very High	◐ Long tunnel required	4 3 3 1 2 ● ◔ ◐ ◔ ○
Canton Railroad Alignment	11630	MARC & Bayview	● Very Good	● Very Good	● At MARC	◔ $197.5	◴ 5:44	◐ Trucking companies in several locations, west of NS, south of Eastern, west of Oldham, south of Lombard	◴ No stations near proposed developments	◐ Operating agreement with Canton Railroad required, MTA coordination	● None	● None	● Low Impact - Grade crossing at Haven, Lombard and Ponca Streets	○ Contamination Concerns - Very High	● Good. At-grade alignment that stays west of the NS right-of-way, avoids the design problems associated with crossing over or under the O'Donnell Street Viaduct.	7 1 2 2 1 ● ◔ ◐ ◔ ○
Central Alignment (from Boston Street)	12060	Highlandtown, MARC & Bayview	● Very Good	● Very Good	● At MARC	◔ $186.4	◴ 5:33	◐ Several business properties & demolition of buildings, trucking companies east of NS	◴ No stations near proposed developments	◐ Operating agreement with Canton RR & NS required, MTA coordination	● Low	● Low	● Low Impact - Grade crossing at Haven Street	● Contamination Concerns - Low	● Good. At-grade alignment that stays west of the NS right-of-way, avoids the design problems associated with crossing over or under the O'Donnell Street Viaduct.	4 5 2 2 0 ● ◔ ◐ ◔ ○
Lombard Alignment (from Boston Street)	12650	Highlandtown, MARC & Bayview	● Very Good	● Very Good	● At MARC	● $139.4	◴ 6:35	○ Acquisition & demolition of a square block of small businesses and residences. More properties may be needed.	◐ Near Crown Industrial Park	◐ Operating agreement with Canton RR & NS required	◴ Along Lombard Street	◴ Along Lombard Street	◴ High Impact - Grade crossing at Haven & Lombard. Shared use on Lombard. Reduced lanes on Lombard under 895	◔ Contamination Concerns - Low	◐ The transitway is likely to be on an aerial structure over the NS tracks to avoid major structural modifications to the existing Lombard Street Viaduct as well as to avoid major impacts to traffic at the intersection of Lombard and Ponca Streets	4 1 3 4 1 ● ◔ ◐ ◔ ○
Kresson A Alignment (from Boston Street)	12630	Highlandtown, MARC & Bayview	● Very Good	● Very Good	● At MARC	◔ $191.0	◐ 4:51	◴ Acquisition of former railroad land from the current owner & the removal of a small railroad bridge	◐ Near Crown Industrial Park	◐ Operating agreement with Canton RR required	● None	● None	● No impacts	◐ Contamination Concerns - Moderate	● Good. At-grade alignment that stays west of the NS right-of-way, avoids the design problems associated with crossing over or under the O'Donnell Street Viaduct.	7 1 4 1 0 ● ◔ ◐ ◔ ○
Kresson B Alignment (from Boston Street)	13040	Highlandtown, MARC & Bayview	● Very Good	● Very Good	● At MARC	◔ $191.5	◴ 5:03	◴ Acquisition of former railroad land from the current owner & the removal of a small railroad bridge	◐ Near Crown Industrial Park	◐ Operating agreement with Canton RR required	● None	● None	● No impacts	◐ Contamination Concerns - Moderate	● Good. At-grade alignment that stays west of the NS right-of-way, avoids the design problems associated with crossing over or under the O'Donnell Street Viaduct.	7 1 3 2 0 ● ◔ ◐ ◔ ○
Kresson C Alignment (from Boston Street)	9080	Highlandtown & MARC	○ Poor. Shuttle required.	● Very Good	● At MARC	◔ $156.6	◐ 4:12	◴ Acquisition of former railroad land from the current owner & the removal of a small railroad bridge	◐ Near Crown Industrial Park	◐ Operating agreement with Canton RR required, MTA coordination	● None	● None	◐ Transit in Lombard Street	◐ Contamination Concerns - Moderate	◔ Good. A separate short bridge/short tunnel required to avoid structural modifications to the existing highway bridge	4 2 5 1 1 ● ◔ ◐ ◔ ○
Northern Alignment (from Boston Street)	14850	Highlandtown, MARC & Bayview	● Very Good	● Very Good	● At MARC	◔ $195.0	◴ 5:33	◴ ROW along the north side of Fayette Street, Janney Street Park	◐ Near Crown Industrial Park	◐ Operating agreement with Canton RR & NS required	● None	● None	● No impacts	○ Contamination Concerns - High. Impacts Janney Street Park	● Good. At-grade alignment that stays west of the NS right-of-way, avoids the design problems associated with crossing over or under the O'Donnell Street Viaduct and the Canton and NS rights-of-way nearly the same point.	7 1 2 2 1 ● ◔ ◐ ◔ ○
Eastern/Fleet – Eastern Avenue Group																
Eastern-Fleet Alignment	8020	Bayview	◴ 0.25 mile walk or a shuttle required	○ Not provided	○ Not provided	● $132.3	◔ 3:59	● None	○ Conflicts with Industrial redevelopment	◐ May impact Pemco's access to freight	○ Along Eastern Avenue	○ Along Eastern Avenue	○ Transit on Eastern Avenue	○ Very High Contamination Concerns	○ Required grade is 8.6% and it will be 100 feet long located b/w a pair of reverse vertical curves	2 1 1 1 8 ● ◔ ◐ ◔ ○
Eastern/Fleet – East Baltimore MARC Station Group																
Central Alignment (from Eastern-Fleet)	8720	MARC & Bayview	● Very Good	● Very Good	● At MARC	◔ $158.3	◐ 4:30	◐ Several business properties, demolition of several buildings, trucking company	◴ No stations near proposed developments	◐ Operating agreement with Canton RR & NS required, MTA coordination	● None	◔ Eastern Avenue	◴ Transit on Eastern Avenue & Fleet Street	◔ Contamination Concerns - Low	● Good. No apparent challenges	5 2 3 3 0 ● ◔ ◐ ◔ ○
Lombard Alignment (from Eastern-Fleet)	11180	MARC & Bayview	● Very Good	● Very Good	● At MARC	● $111.2	◐ 5.36	○ Acquisition & demolition of a square block of small businesses and residences. More properties may be needed.	◴ No stations near proposed developments	◐ Operating agreement with Canton RR & NS required.	○ Lombard - High	○ Lombard Street	○ Grade crossing at Haven & Lombard. Shared use on Lombard. Reduced lanes on Lombard under 895	◔ Contamination Concerns - Low	◐ The transitway is likely to be on an aerial structure over the NS tracks to avoid major structural modifications to the existing Lombard Street Viaduct as well as to avoid major impacts to traffic at the intersection of Lombard and Ponca Streets	4 1 3 1 4 ● ◔ ◐ ◔ ○
Kresson A Alignment (from Eastern-Fleet)	11160	MARC & Bayview	● Very Good	● Very Good	● At MARC	◔ $163.0	◐ 4.43	◴ Meals on wheels, demolition of the building, ROW required at the northeast corner of Eastern and Haven	◴ No stations near proposed developments	◐ Operating agreement with Canton RR & NS required.	◴ Eastern - High	◴ Eastern - High	◴ Transit on Eastern Avenue & Fleet Street	◐ Contamination Concerns - Moderate	● Good. This alignment provides the most favorable horizontal alignment approach for the transitway to cross under the I-895 ROW near the south end of its viaduct over the NS Bayview railroad yards and Amtrak's Northeast Corridor.	4 1 3 5 0 ● ◔ ◐ ◔ ○
Kresson B Alignment (from Eastern-Fleet)	11570	MARC & Bayview	● Very Good	● Very Good	● At MARC	◔ $163.5	◴ 5.36	◴ Meals on wheels, demolition of the building, ROW required at the northeast corner of Eastern and Haven	◴ No stations near proposed developments	◐ Operating agreement with Canton RR & NS required.	◴ Eastern - High	◴ Eastern - High	◴ Transit on Eastern Avenue & Fleet Street	◐ Contamination Concerns - Moderate	● Good. No apparent challenges	4 1 2 6 0 ● ◔ ◐ ◔ ○
Kresson C Alignment (from Eastern-Fleet)	7610	MARC	○ Poor. Shuttle required	● Very Good	● At MARC	● $128.6	◐ 4.45	◴ Meals on wheels, demolition of the building, ROW required at the northeast corner of Eastern and Haven	◴ No stations near proposed developments	◐ Operating agreement with Canton RR & NS required, MTA coordination	◴ Eastern - High	◴ Eastern - High	◴ Transit on Eastern Avenue & Fleet Street	◐ Contamination Concerns - Moderate	◐ Separate bridge/short tunnel required to avoid structural modifications to the existing highway bridge	3 0 4 5 1 ● ◔ ◐ ◔ ○
Northern Alignment (from Eastern-Fleet)	11770	MARC & Bayview	● Very Good	● Very Good	● At MARC	◔ $167.0	◐ 4.54	○ Meals on wheels, demolition of the building, ROW required at the northeast corner of Eastern and Haven. Several old buildings and ROW on the north side of Fayette Street. Janney Street Park.	◴ No stations near proposed developments	◐ Operating agreement with Canton RR & NS required.	◴ Eastern - High	◴ Eastern - High	◴ Transit on Eastern Avenue & Fleet Street	○ Contamination Concerns - High. Impacts Janney Street Park	● Good. This alignment provides the most favorable horizontal alignment approach for the transitway to cross under the I-895 ROW near the south end of its viaduct over the NS Bayview railroad yards and Amtrak's Northeast Corridor.	4 1 2 4 2 ● ◔ ◐ ◔ ○

LEGEND

● Very Favorable | ◔ Favorable | ◐ Neutral | ◴ Unfavorable | ○ Very Unfavorable

This assessment is qualitative only and no attempt has been made to weight the evaluation criteria. There may be cases where the alternative is considered unfavorable with regards to just one or two criteria. However, it is possible that this criterion and/or the nature of the impact make it a fatal flaw thereby requiring that it is precluded from further studies/analyses. Of the twenty alignments evaluated, four alignments are suggested for exclusion from further analyses. These are as follows:

- Lombard Alignment (from Boston Street)
- Lombard Alignment (from Eastern-Fleet)
- Northern Alignment (from Boston Street)
- Northern Alignment (from Eastern-Fleet)
- Pemco Alignment

The Lombard Alignments (both from Boston Street and from Eastern-Fleet) are recommended to be excluded from further analyses. These alignments require acquisition and demolition of a square block of small businesses and residences. They will result in significant adverse impacts to traffic on Lombard Street. In addition, the construction of these alignments poses significant challenges. For these reasons, the Lombard Alignments are recommended for exclusion from further discussion/analyses.

The Northern Alignments (both from Boston Street and from Eastern-Fleet) are recommended to be excluded from further analyses because each one of them impacts the Janney Street Park. According to the Section 4(f) of the U.S. Department of Transportation Act of 1966 (49 U.S.C. 393[c]), the use of land from a publicly-owned parks or recreation area, wildlife or waterfowl refuge, or land from a significant historic site (as determined by the official having jurisdiction over the park, recreation area, refuge or site) is permitted only if there is **no prudent and feasible alternative** to using that land; and the project includes all possible planning to minimize harm to the park, recreation area, wildlife and waterfowl refuge, or historic site resulting from the use. As other prudent and feasible alternatives exist, these two should be eliminated from further discussion/analyses.

Pemco site is an important industrial redevelopment property within the City, particularly because of its freight rail connection to the Canton Railroad line and proximity to Interstates 95 and 895. A station location at Pemco site would require a taking of this prime industrial property. However, the Pemco Alignment offers no significant advantages over other alignments. Therefore, the Pemco Alignment is recommended to be excluded from further discussion/analyses.

Based on the composite evaluation, six alternatives are considered most feasible. These are as follows:

- Central Alignment (from Boston Street)
- Kresson A Alignment (from Boston Street)
- Kresson B Alignment (from Boston Street)
- Central Alignment (from Eastern-Fleet)
- Kresson A Alignment (from Eastern-Fleet)
- Kresson B Alignment (from Eastern-Fleet)

These alignments originate at Boston and Conkling Streets. These alignments provide access to the heart of the Bayview Medical Center and connect to the proposed East Baltimore MARC Station. The impacts to residences and/or parking and businesses are low to none in each of these cases. Kresson Alignments do not have any adverse impacts to traffic whereas the Central Alignment has minimal traffic impacts. These alignments pose no construction challenges. Out of a total of thirteen evaluation criteria, these alignments were considered 'very favorable' or 'favorable' for at least eight evaluation criteria.

Conclusions

Based on the results of the Alternatives Evaluation, the Red Line Extension to Bayview Feasibility Study recommends the following alternatives as most promising with least adverse impacts.

- Central Alignment (from Boston Street)
- Kresson A Alignment (from Boston Street)
- Kresson B Alignment (from Boston Street)
- Central Alignment (from Eastern-Fleet)
- Kresson A Alignment (from Eastern-Fleet)
- Kresson B Alignment (from Eastern-Fleet)

APPENDIX A

STATIONS FEASIBILITY STUDY

1. INTRODUCTION

Placement of stations within a given transit corridor is an important part of designing the transit system. There are over 50 factors that aid in this placement. These factors range from demographic analysis to community and agency input. This section describes specifically the community demographics of the proposed study area for the Bayview Feasibility Study.

2. COMMUNITY DEMOGRAPHIC ANALYSIS

Community demographics are statistical analyses that are used to describe the characteristics of the population of the community. The four most commonly used variables are as follows:

- Transportation to Work
- Employment
- Population
- Housing Density

Analysis of each of these variables was completed on a Census Block Group. A Census Block Group is a geographic unit of measurement in which specific variables such as employment, housing density, among others, are measured for Census Bureau report information. These analyses were completed with only approved proposed development included. There are several parcels of land that are either in discussion or early planning stages for re-development and are not included in these demographic analyses. The demographics as illustrated were obtained from the 2000 census with supplemental information provided by the City of Baltimore.

The figures A1 through A4 illustrate the entire study area for the Bayview Feasibility Study, however specific station analysis is completed on a one-quarter mile "walk zone." This "walk zone" is illustrated on the individual station graphics further in this section and is considered that distance someone would be willing to walk to gain access to transit. The actual walk zone would differ from that shown as it is a quarter-mile walkable path (along roads, sidewalks, etc.), not a straight quarter-mail from the station. However, the circle is used for graphical purposes. The Federal Transit Administration (FTA) allows analysis for a transit system based on a half-mile walk zone. As this analysis is completed on a census block level, and any census block level touching the quarter-mile walk zone is included, much of the half-mile analysis has therefore been incorporated into this feasibility study.

A. Transportation to Work

Figure A1 illustrates Transportation to Work within the study area. Specifically, the factors mapped include individuals who utilize their own vehicles to get to their jobs. The areas that are highlighted in red and orange illustrate those individuals that do not have or use their own vehicle to get to work (up to 65% of the population in these regions) and may rely upon transit. It should be noted that this demographic is valuable when analyzing residential areas but it does not provide much insight into areas where the primary land use is business or commercial areas such as the Bayview campus.

There are no areas that are highlighted in red within the limits of the Feasibility Study. However, the areas that are highlighted in yellow generally represent the residential neighborhoods of Greektown and/or Highlandtown.

B. Employment

Figure A2 illustrates employment within the study area, specifically those adults aged 16 and older who reside in the area and have jobs, whether in this specific geographic area or in other regions. The highest concentration of employed individuals is illustrated in red and orange. The region surrounding the Bayview campus provides the highest concentration of employees.

C. Population Density

Figure A3 illustrates the population density per acre within the study area. Population density represents the number of individuals residing within a specific area. The highest areas of density (as shown in maroon, red, and orange) represent areas that will support transit in some fashion. Similar to the transportation to work demographic, this demographic is most valuable when analyzing residential areas. Areas that are business or commercial in nature may still support Bus or Rail based on the number of employees and patrons coming to that destination, but this would not be reflected in the numbers for this statistics.

D. Housing Density

Figure A4 illustrates the housing density, meaning the number of housing units per acre within the study area. The highest areas of density (as shown in maroon, red, and orange) represent areas that will support transit in some fashion. Similar to the transportation to work demographic, this demographic is most valuable when analyzing residential areas. Areas that are business or commercial in nature may still support Bus or Rail based on the number of employees and patrons coming to that destination, but this would not be reflected in the numbers for this statistics.

Some of the area that is highlighted in red is a part of the residential neighborhoods – Greektown and Highlandtown, though the entire neighborhoods do not show densities that will support transit.

3. CONCLUSION

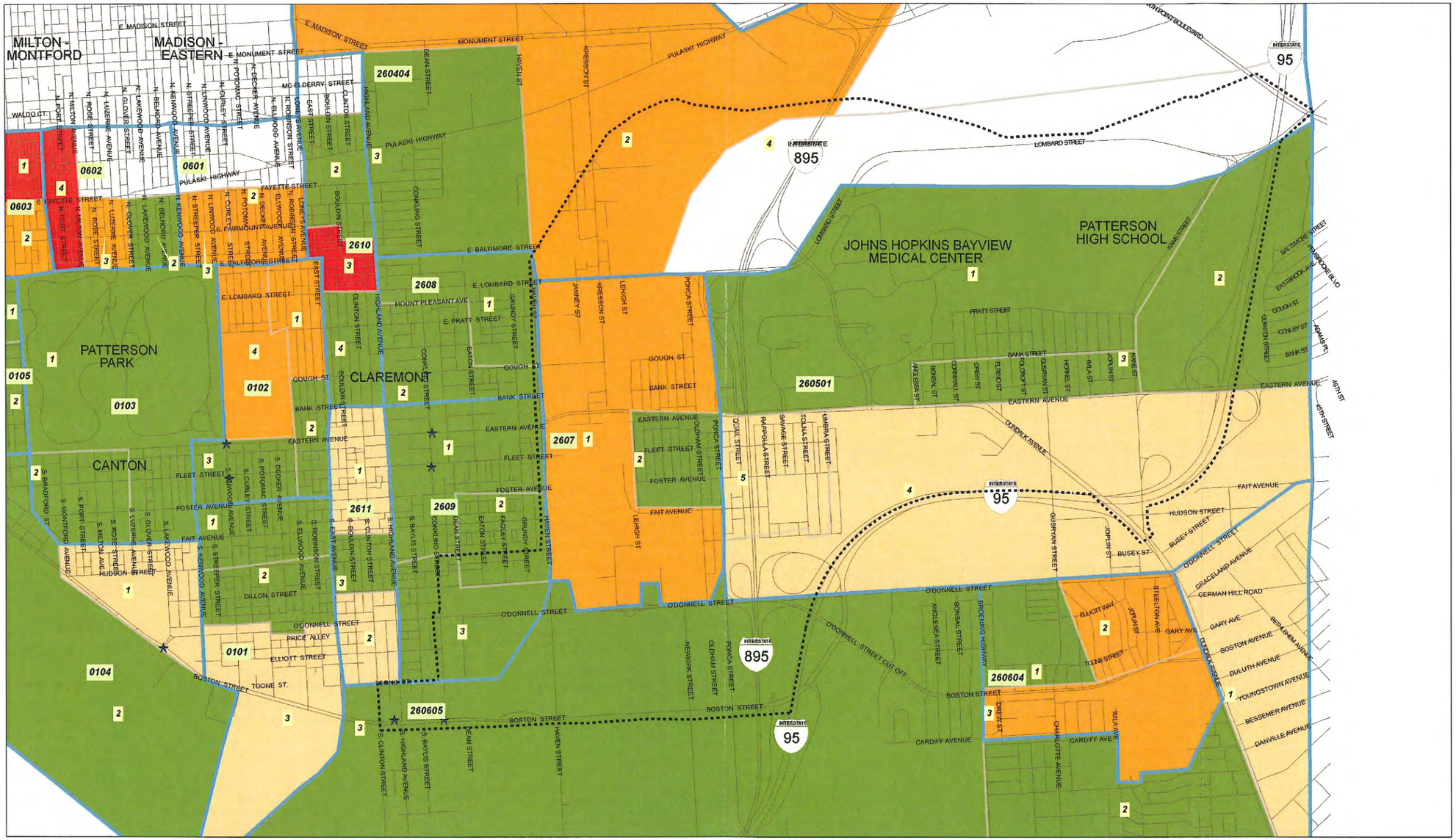
Based on the Community Demographics Analysis, there are no clear locations for the placement of a station. This is primarily due to the demographics analyzed represent residential areas and "origin" types of trips, rather than employment centers and "destination" types of trips, such as the Bayview Medical Center. Also, there are several industrial areas that are either shut down or will be shut down shortly. These have been identified as possessing redevelopment potential. However, the demographic analyses consider only approved developments and these industrial areas are not currently taken into account for their future potential transit desirability.

Bayview Campus and the East Baltimore MARC Station have been identified as potential destinations in the study area. It is desired that there is a station between the existing Red Line Corridor and the Bayview Extension. Based on these factors and the community demographics analysis, it appears that the residential neighborhoods of Highlandtown and Greektown can be considered for potential station locations. These residential areas have significant percentage of population that may support transit and also benefit from improved mass transit in the area. The housing densities may indicate reasonable support for transit as of now. With the planned and proposed redevelopment projects, these numbers are likely to improve. It is therefore recommended to place a station in the residential neighborhoods of Greektown or Highlandtown.

RED LINE EXTENSION to BAYVIEW FEASIBILITY STUDY AREA

Census Geography

TRANSPORTATION TO WORK: CAR TRUCK or VAN



LEGEND

- ★ Stations March 2007
- Census Tracts
- Census Block Groups
- Road Centerlines
- Bayview Study Area

Means of Transportation to Work: Car Truck or Van (Percent)

- 0.0 - 45.00
- 45.1 - 65.0
- 65.1 - 85.0
- 85.1 - 100.0

MEANS OF TRANSPORTATION TO WORK: CAR TRUCK OR VAN:
Mean = 65.6%
Standard Deviation = 19.7%
Maximum = 100%

As a percent of Total Workers Aged 16 Years and Over

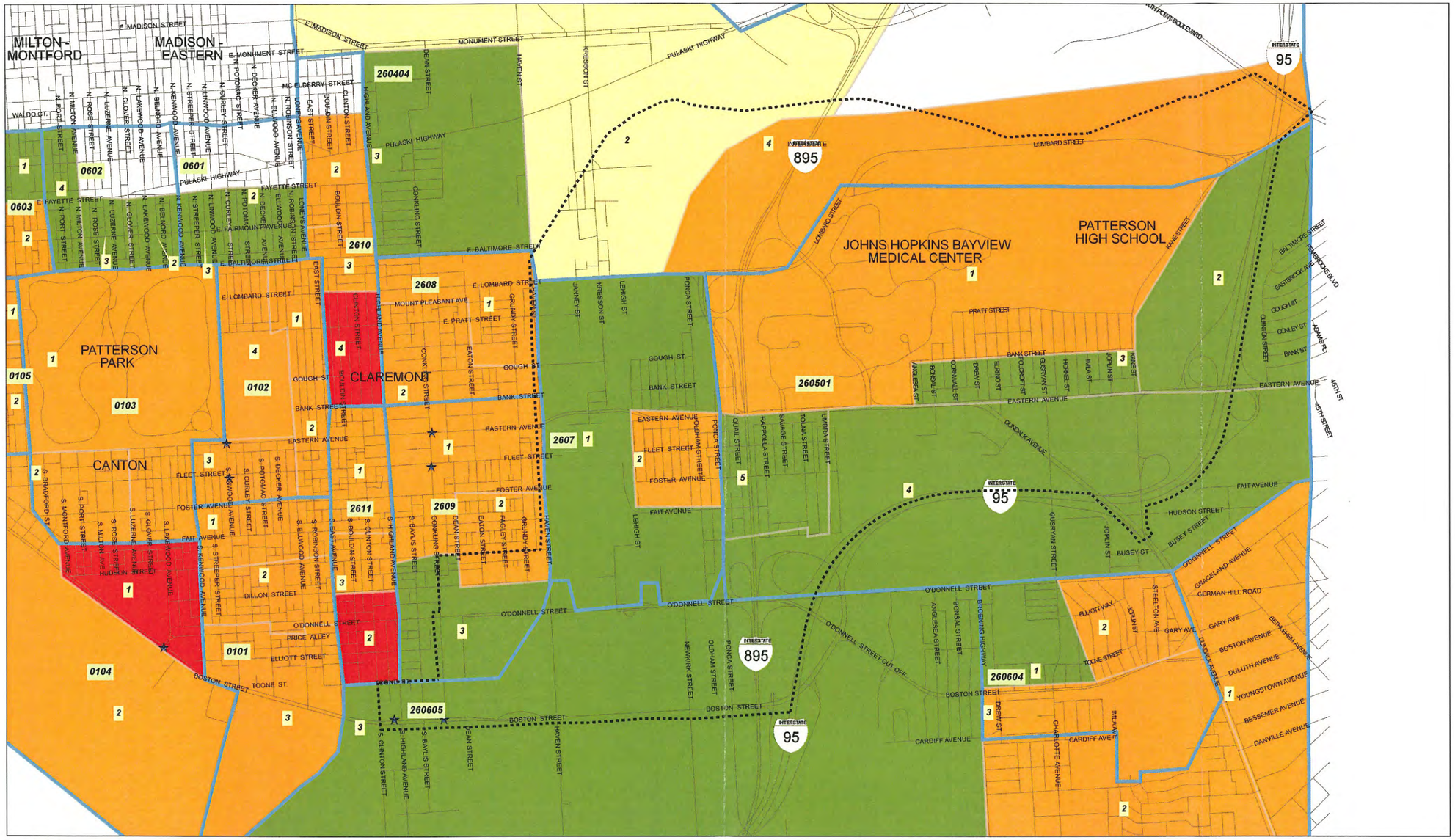
Not to Scale
Plotted June 2007
This information not intended for public distribution

FIGURE A1
INTERNAL USE ONLY

RED LINE EXTENSION to BAYVIEW FEASIBILITY STUDY AREA

Census Geography

CONCENTRATION OF WORKERS: EMPLOYEES PER TOTAL POPULATION AGED 16 YEARS AND OLDER



LEGEND

- ★ Stations March 2007
- Census Tracts
- Census Block Groups
- Road Centerlines
- Bayview Study Area

Concentration of Workers (Percent)

- 0.0 - 28.0
- 28.1 - 48.0
- 48.1 - 68.0
- 68.1 - 79.9

EMPLOYEES PER TOTAL POPULATION AGED 16 YEARS AND OLDER:
Mean = 48.3
Standard Deviation = 15.5
Maximum = 79.9

EMPLOYEES = Total employed males + total employed females divided by total persons 16 years and older as a percent

Not to Scale
Plotted June 2007
This information not intended for public distribution

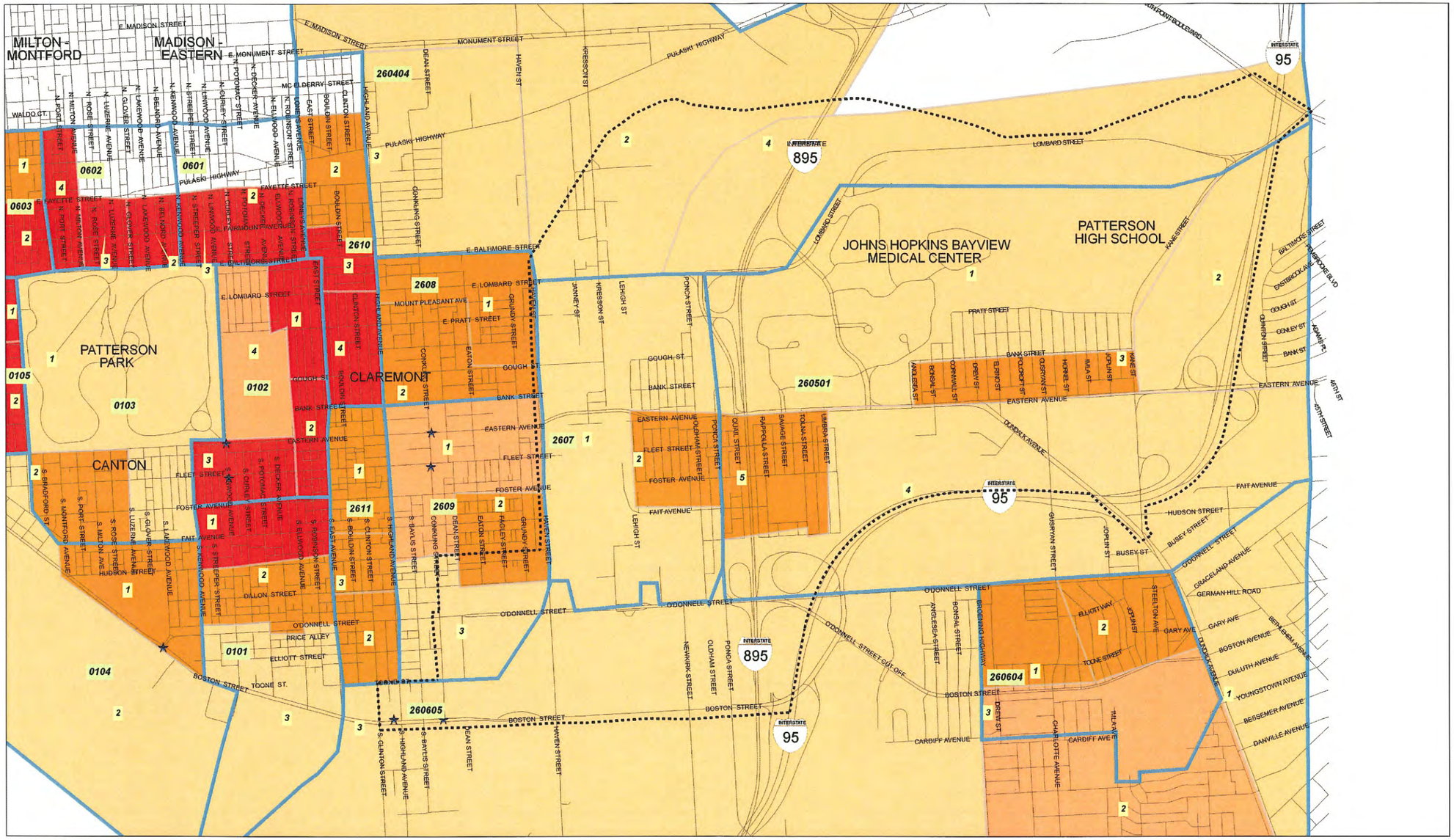
FIGURE A2
INTERNAL USE ONLY

RED LINE EXTENSION to BAYVIEW FEASIBILITY STUDY AREA

Census Geography

POPULATION DENSITY

Population per Acre



LEGEND

- ★ Stations March 2007
- Census Tracts
- Census Block Groups
- Road Centerlines
- Bayview Study Area

Density: Population Per Acre

- 0.0 - 12.0
- 12.1 - 21.0
- 21.1 - 42.0
- 42.1 - 71.5

POPULATION DENSITY
Population per acre
Project Area mean = 21.1
Standard deviation = 15
Maximum = 54.3

Not to Scale
Plotted June 2007
This information not intended for public distribution

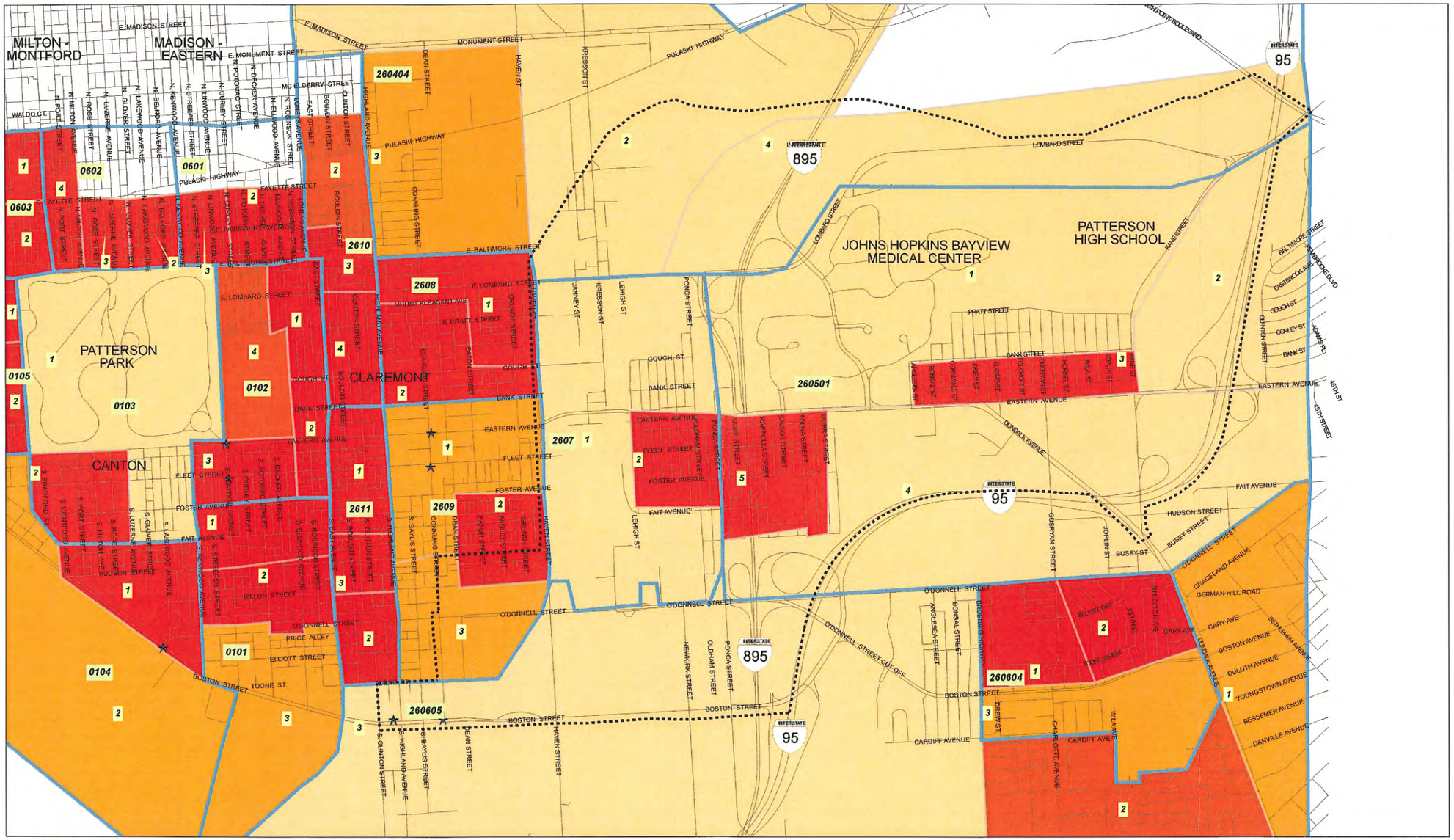
FIGURE A3
INTERNAL USE ONLY

RED LINE EXTENSION to BAYVIEW FEASIBILITY STUDY AREA

Census Geography

HOUSING DENSITY

Housing Units per Acre



LEGEND

- ★ Stations March 2007
- Census Tracts
- Census Block Groups
- Road Centerlines
- Bayview Study Area

Density: Units per Acre

- 0 - 3 Does not support Bus or Rail
- 3.01 - 7.0 May support Bus
- 7.01 - 9.0 Supports Bus - May support Rail
- 9.01 - 29.0 Supports Bus and Rail

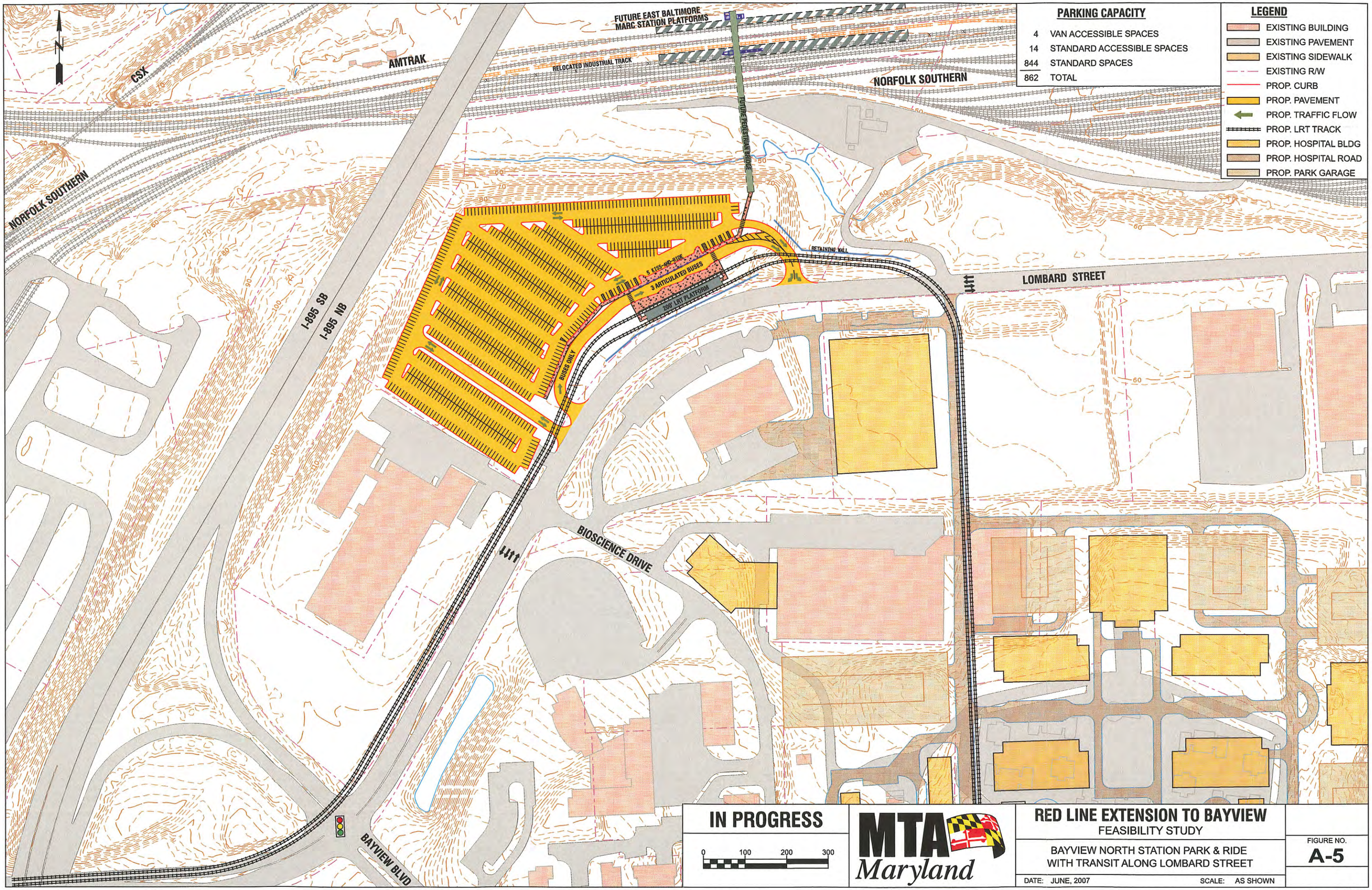
HOUSING DENSITY
Occupied Units per Acre
Mean = 10.3
Standard Deviation = 7.4
Maximum = 24.7

Not to Scale
Plotted June 2007
This information not intended for public distribution

FIGURE A4
INTERNAL USE ONLY

PARK AND RIDE LAYOUTS

The potential stations at Bayview North near the proposed East Baltimore MARC Station are anticipated to have Park and Ride lots for commuters. The following figures A5 and A6 show conceptual layouts for this Park and Ride location.


N
CSX
AMTRAK
NORFOLK SOUTHERN
NORFOLK SOUTHERN
FUTURE EAST BALTIMORE MARC STATION PLATFORMS
RELOCATED INDUSTRIAL TRACK
FUTURE PEDESTRIAN BRIDGE
I-895 SB
I-895 NB
5 KISS-AND-RIDE
3 ARTICULATED BUSES
200' LRT PLATFORM
BUSES ONLY
RETAINING WALL
LOMBARD STREET
BIOSCIENCE DRIVE
BAYVIEW BLVD
PARKING CAPACITY
4 VAN ACCESSIBLE SPACES
14 STANDARD ACCESSIBLE SPACES
844 STANDARD SPACES
862 TOTAL
LEGEND
EXISTING BUILDING
EXISTING PAVEMENT
EXISTING SIDEWALK
EXISTING R/W
PROP. CURB
PROP. PAVEMENT
PROP. TRAFFIC FLOW
PROP. LRT TRACK
PROP. HOSPITAL BLDG
PROP. HOSPITAL ROAD
PROP. PARK GARAGE
IN PROGRESS
0 100 200 300
MTA Maryland
RED LINE EXTENSION TO BAYVIEW
FEASIBILITY STUDY
BAYVIEW NORTH STATION PARK & RIDE
WITH TRANSIT ALONG LOMBARD STREET
DATE: JUNE, 2007
SCALE: AS SHOWN
FIGURE NO.
A-5

LEGEND

- EXISTING BUILDING
- EXISTING PAVEMENT
- EXISTING SIDEWALK
- EXISTING R/W
- PROP. CURB
- PROP. PAVEMENT
- PROP. TRAFFIC FLOW
- PROP. LRT TRACK
- PROP. HOSPITAL BLDG
- PROP. HOSPITAL ROAD
- PROP. PARK GARAGE

PARKING CAPACITY

4	VAN ACCESSIBLE SPACES
14	STANDARD ACCESSIBLE SPACES
814	STANDARD SPACES
832	TOTAL

CSX

AMTRAK

RELOCATED INDUSTRIAL TRACK

FUTURE EAST BALTIMORE MARC STATION PLATFORMS

NORFOLK SOUTHERN

NORFOLK SOUTHERN

EXISTING PIER

EXISTING ABUTMENT

FUTURE PEDESTRIAN BRIDGE

200' LRT PLATFORM

3 ARTICULATED BUSES

5 KISS-AND-RIDE

BUSES ONLY

RETAINING WALL

LOMBARD STREET

I-895 SB

I-895 NB

RETAINING WALL

BIOSCIENCE DRIVE

BAYVIEW BLVD

LOMBARD STREET

IN PROGRESS

0 100 200 300

MTA Maryland

RED LINE EXTENSION TO BAYVIEW
FEASIBILITY STUDY

BAYVIEW NORTH STATION PARK & RIDE
WITH TRANSIT ALONG LOMBARD STREET

DATE: JUNE, 2007 SCALE: AS SHOWN

FIGURE NO.
A-6

APPENDIX B

I. EXISTING ENVIRONMENTAL CONDITIONS

A detailed environmental analysis is not warranted on a feasibility study. However, to understand the social, cultural, and natural environment of the Bayview study area, an inventory of readily available data on environmental features was gathered and reviewed. The results of this analysis follow.

1. SOCIAL ENVIRONMENT

Existing Land Use

The existing land use data was obtained from the City of Baltimore. The existing land uses are shown on in Figure B-1. The western third of the study area is industrial land use concentrated around the active Norfolk Southern and CSX freight rail lines. Johns Hopkins Bayview Medical Center occupies a large central portion of the study area, along with Joseph Lee Park, Our Lady of Fatima Catholic Church and School, and Patterson High School. There are two residential pockets in the study area: Greektown and Joseph Lee neighborhoods. Commercial land uses make up the remaining part of the study area and are concentrated along I-95 and I-895.

Proposed Development

The southeast region of Baltimore City is on the brink of some extensive redevelopment. The proposed redevelopment projects in the southeast region of Baltimore City are shown on Figures B-1 and B-2.

The 130-acre Johns Hopkins Bayview Medical Center has been a catalyst for redevelopment in the southeast region of Baltimore City. The Johns Hopkins Bayview Campus Master Plan is being implemented with about a third of the proposed buildings constructed. A total of five million square feet of building space is proposed for this campus.

Other proposed development projects are also under consideration within the Bayview feasibility study area. A Greektown North project is proposed with 220 residential units. A Greektown Hale-KSI project is proposed with 1,100 residential units and 70 townhouses. The Brewer's Hill project includes, 425,000 square feet of office, 233,000 square feet of warehouse, 478,500 square feet of retail, and 1,175 residential units.

There are other redevelopment projects proposed or underway not in the study area but within the immediate vicinity. The Canton Crossing project includes 1.7 million square feet of office space, 450,000 square feet of retail, 50,000 square feet of restaurant space, two hotels with 450 rooms, and 100 condominiums. The Duke Project at the former GM site proposes 192,000 square feet of office, and 2,696,900 square feet of warehouse space. Further west the Lighthouse Point, American Can, and Safeway Shopping Center have added more residential and retail space to the Canton neighborhood.

Landuse Code

- Medium-Density Residential
- High-Density Residential
- Commercial
- Industrial
- Institutional
- Open Urban Land
- Transportation

Existing Community Resources

- Enterprize Zone
- Hospitals
- Schools
- Churches
- Cemetery
- Parks

Development Opportunities

- City Mixed Use Development Site
- Redevelopment Potential

0 500 1,000 2,000 Feet

N

Bayview Study Area

KRESSON

Janney St. Park

E LOMBARD ST

HOPKINS BAYVIEW

Johns Hopkins Bayview Medical Center

Joseph Lee Park

Patterson High School

Our Lady of Fatima Roman Catholic Church

Our Lady of Fatima School

EASTWOOD

Greektown North

JOSEPH LEE

S HAVEN ST

EASTERN AV

Luther Memorial Lutheran Church

Saint Nicholas Greek Orthodox Church

GREEKTOWN

South East Middle School

Sacred Heart of Jesus Roman Catholic Church

Notre Dame Convent of the Sacred Heart

Fagely St. Urban Lot

Holy Redeemer Chapel

Ruhrah School

Greektown Hale

BREWERS HILL

Canton Elementary School

Mount Carmel Cemetery

Saint Martha Cemetery

Oheb Shalom Cemetery

Evangelist Lutheran Cemetery

Graceland Park-O'Donnel Heights School

Saint Brigids School

United Evangelical Church

Saint Brigids Catholic Church

Canton United Methodist Church

S CONKLING ST

Bayview Study Area

Kingdom Hall of Jehovahs Witnesses

Hebrew Cemetery

GRACELAND PARK

O'DONNELL ST

Second Congregational Church

Brewer's Hill

MEDFORD

Swartz Cemetery

I-95 Travel Plaza

Playlot and Wading Pool

Canton Soccer Field

BOSTON ST

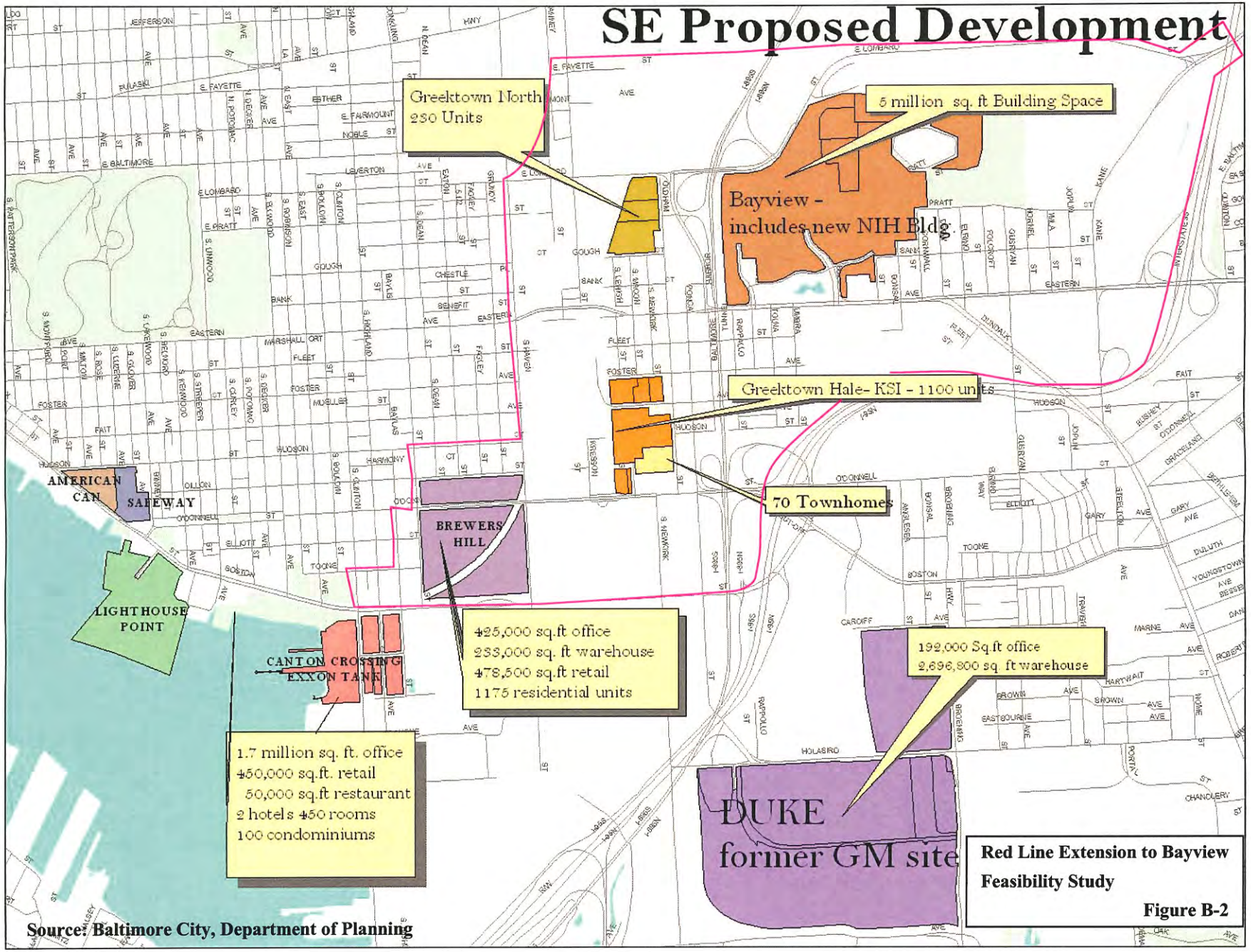
Waterfront Passive Park

Inventory of Existing Social Resources and Redevelopment Opportunities

Red Line Extension to Bayview

- Feasibility Study -

Figure B-1


SE Proposed Development
Greektown North
230 Units
5 million sq. ft Building Space
Bayview -
includes new NIH Bldg.
Greektown Hale- KSI - 1100 units
70 Townhomes
AMERICAN CAN
SAFEWAY
BREWERS HILL
LIGHT HOUSE POINT
CANTON CROSSING
EXXON TANK
425,000 sq.ft office
233,000 sq. ft warehouse
478,500 sq.ft retail
1175 residential units
1.7 million sq. ft. office
450,000 sq.ft. retail
50,000 sq.ft restaurant
2 hotels 450 rooms
100 condominiums
192,000 Sq.ft office
2,696,800 sq. ft warehouse
DUKE
former GM site
Red Line Extension to Bayview
Feasibility Study
Figure B-2
Source: Baltimore City, Department of Planning

Continued coordination with the City and Johns Hopkins will be essential if a project in the Bayview study area progresses into planning and preliminary engineering.

Community Resources

There are two residential neighborhoods within the Bayview Study Area: Greektown and Joseph Lee. The residences in these two neighborhoods are traditional Baltimore townhouses. The following community resources are within the study area to support these neighborhoods.

- Schools – 3
  - John Ruhrah Elementary and Mora Crossman Community Center
  - Patterson High School
  - Our Lady of Fatima School (Grades Pre-Kindergarten to 8th Grade)
- Churches – 4
  - Holy Redeemer Chapel
  - Saint Nicholas Greek Orthodox Church
  - Luther Memorial Lutheran Church
  - Our Lady of Fatima Roman Catholic Church
- Parks – 2
  - Janney Street Park
  - Joseph E. Lee Park

Environmental Justice Communities

Environmental Justice (EJ) is a term coined in Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-income Populations*, dated February 11, 1994, from the President of the United States. In general, this order requires that if an agency's program or activity will utilize any federal funds they must strive to achieve environmental justice by:

- Making a meaningful effort to involve low-income and minority populations in the decision-making process, and
- Evaluating the favorable and adverse impacts to human health or the environment of the activity upon minority or low-income populations.

This Executive Order served to amplify the provisions of Title VI of the Civil Rights Act of 1964, which generally states that no group on the ground of race, color or national origin shall be discriminated against. Further related requirements were issued in Executive Order 13166, *Improving Access to Services for Persons with Limited English Proficiency*, requiring project outreach to include people of limited English proficiency.

Combined the provisions of EJ, Title VI, and EO 13166 promote a public involvement strategy for transportation projects that targets minorities, low-income and limited English proficiency communities, as well as communities of the same national origin and/or religious affiliation, aging populations, or the disabled.

Because this Bayview Study is at a feasibility study level no public outreach efforts to communities in the study area was conducted. However, Census information was reviewed to preliminarily identify minority and low-income populations in the study area. The Greektown neighborhood had the highest percentage of non-whites (39%) of the Census Block Groups within the study area. Except for the Oldham Alignment, none of the other alignments identified would traverse through this neighborhood.

If a project in the Bayview study area were to progress into preliminary planning and engineering, public involvement activities would be required and undertaken to ensure that environmental justice is achieved, and so that everyone in the study area is provided an opportunity to get involved in the decision-making process.

2. HAZARDOUS MATERIALS

Historical Development and Land Uses

Past and current land uses can indicate the potential for concern of environmental, surface or subsurface contamination. This area of Baltimore City has a history of industrial uses such as oil refining, metal casting, paint manufacturing, and chemical manufacturing and use. This history of uses, sometimes operating for long periods of time, increases the probability of potential subsurface contamination to the soil and groundwater.

Commercial land uses in the study area include gas stations and auto repair facilities and do not present as significant of a risk as a larger industrial site. However, commercial uses could result in localized contamination from underground storage tanks (UST) or of greater concern could have a history of leaking USTs. Residential uses provide the least potential risk of environmental contamination. Typically petroleum products in storage or use at residential homes are kept in small quantity UST or aboveground storage tanks. Also recorded use of lead paint in these residences is identified as low risk records.

Another potential source of environmental concern within the Bayview study area is from the railroad activities. Railroad operations have been known to be a significant source of surface and subsurface contamination on properties adjacent to railroad lines. The contamination could be from hazardous cargo spills or incremental releases from fuel and lubricants.

Methodology

A database review of publicly available regulatory files was conducted to identify properties within the study area with on-site use, storage, and/or release of hazardous materials or regulated wastes. This review relies on regulatory compliance records to determine which sites have potential for environmental concerned during construction. The file review did not include detailed site inspections and historical investigations of individual properties adjacent to an alignment.

The database search included regulatory files from the Environmental Protection Agency (EPA) and the Maryland Department of Environment (MDE), totaling in 11 databases under the following programs:

- Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)
- Resource Conservation and Recovery Act (RCRA)
- RCRA Corrective Actions (CORRACTS)
- State Equivalent Priority List (SPL)
- State Equivalent CERCLIS List (SCL)
- National Priority List (NPL)
- Toxic Substances Control Act (TSCA)
- State Hazardous Waste System (SHWS)
- Leaking Underground Storage Tank (Leaking UST)
- Registered Underground Storage Tanks (UST)
- Registered Aboveground Storage Tanks (AST)

To organize and analyze the results of the database review, a level of risk was assigned to each site as having a slight, moderate, or high risk of contamination.

Slight Risk Sites – contain suspected contamination or documented contamination that is limited with the property boundary and is not expected to extend into the project right-of-way. Adverse impacts to the project from these sites are considered unlikely.

Moderate Risk Sites – contain documented contamination releases that may extend beyond the property boundary. Contamination may be present in the construction zone at concentrations that require special management and disposal.

High Risk Sites – are properties or clusters of properties with widespread contamination and/or previous or on-going remediation efforts. Contaminated soil and/or groundwater likely extend beyond the property boundaries. Project excavation and dewatering efforts would probably encounter some degree of contamination. Adverse impacts to construction will depend on type of contaminant, migration pathways, depth of excavation, and dewatering conditions.

Risk Level for Contamination

- High
- Moderate

235 Unique Sites were identified during the database search. Only High and Moderate Risk Sites shown.

0 500 1,000 2,000 Feet

N

Bayview Study Area

E LOMBARD ST

S HAVEN ST

S CONKLING ST

EASTERN AV

O'DONNELL ST

BOSTON ST

I 895

I 95

Bayview Study Area

Potentially Contaminated Sites

Red Line Extension to Bayview

- Feasibility Study -

Figure B-3

Results

There were 235 unique sites identified during the database search. Only those having a high or moderate level of risk are shown in Figure B-3. A list of all slight, moderate and high risk sites can be found in 'Hazmat Summary Tables' on page 118.

Only a database search of known hazardous materials has been conducted; a site reconnaissance would need to be conducted in the next phase of work for any of the Bayview Feasibility Study alignments. However, based on the historic records and known land uses in the area, hazardous materials presence with any of the alignments poses the greatest environmental impact in the study area.

Subsurface contamination of soil and groundwater has been documented at various sites in the study area, originating from historic industrial processes and unregulated onsite waste disposal. The enactment and enforcement of environmental regulations in recent decades resulted in the investigation and detection of contamination at many sites. Some degree of clean up effort has been completed at many of the sites in the study area.

The construction of an alignment through a contaminated area will be subject to regulatory requirements for appropriate management and disposal of contaminated materials to protect construction workers and the public. The greatest impacts would be expected in areas of deep excavation, such as tunnel sections, where dewatering would be required and greater volumes of contaminated soil would be encountered.

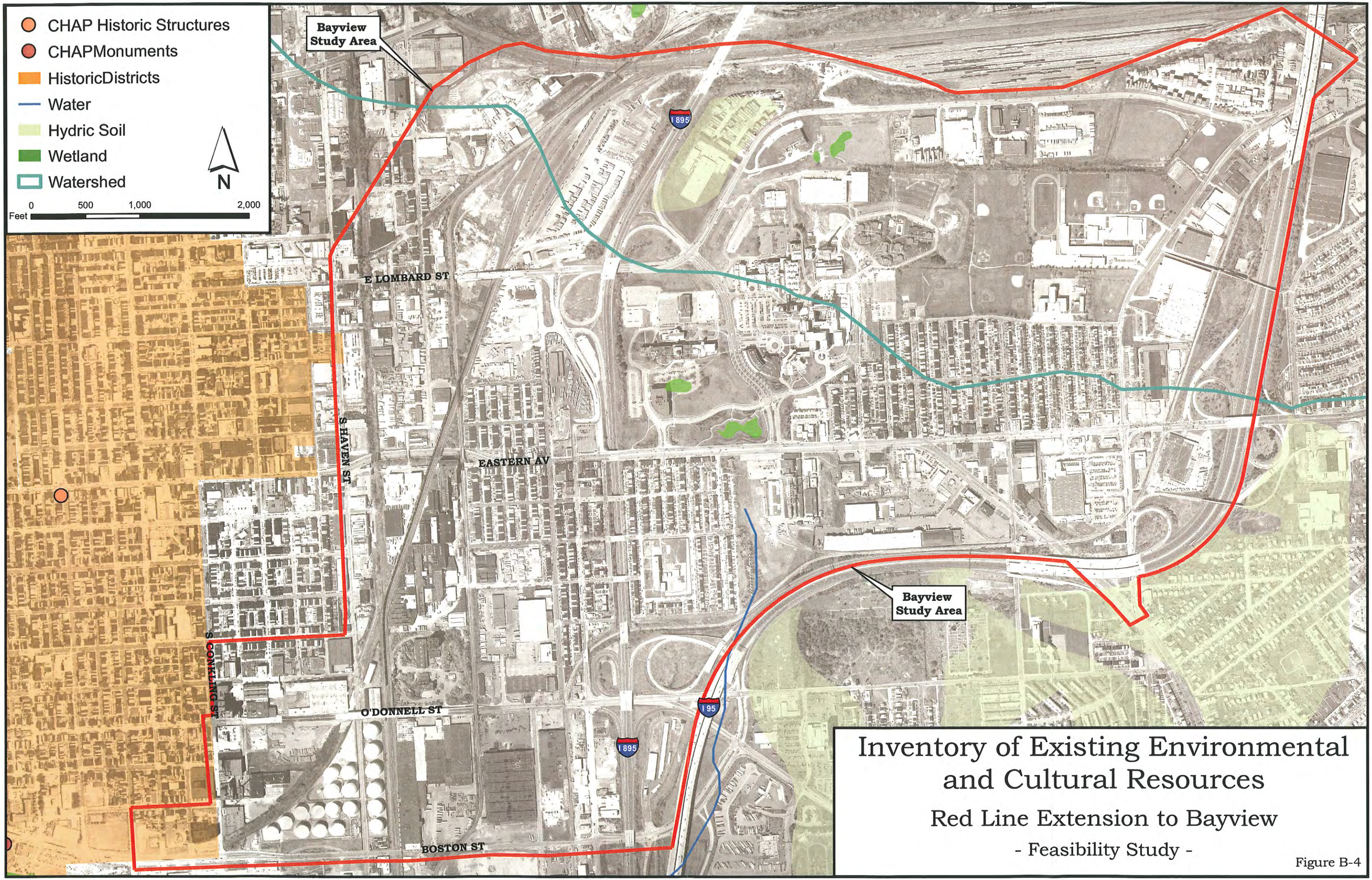
3. CULTURAL RESOURCES

A review of the Maryland Historic Trust (MHT) Maryland Inventory of Historic Properties (MHIP) and the Baltimore City Commission for Historical and Architectural Preservation (CHAP) GIS inventories were reviewed to identify previously recorded historic structures, properties, districts, and archeological sites within the study area.

There is no previously recorded National Register of Historic Places (NRHP), MIHP, or CHAP historic structures within the study area. The western edge of the study area includes minor areas within two National Register Historic Districts. The relationship between the study area boundary and the historic districts are shown on Figure B-4. Haven Street forms the eastern most edge of the Patterson Park-Highlandtown Historic District. Conkling Street and Toone Street form the eastern boundaries of the Canton Historic District.

There was one previously inventoried archeological site identified in the study area. Because this is a sensitive resource little information was available. However, this site is a previously disturbed historic cemetery, from which artifacts were recovered.

If a project in the Bayview study area were to progress into preliminary planning and engineering, Section 106 studies would be conducted to identify historic structures and archeological sites to comply with the National Historic Preservation Act of 1966.



Inventory of Existing Environmental and Cultural Resources

Red Line Extension to Bayview

- Feasibility Study -

Figure B-4

4. NATURAL ENVIRONMENT

The natural environmental resource inventory included a review for wetlands, streams and waters of the US, floodplain, soils, and forests. Because of the history of industrial land uses in the study area, there are very few natural environmental resources in the study area. The results are shown on Figure B-4.

There are no floodplains or forests in the study area. There were a few wetlands and one waters of the US identified in the wetlands inventory from the Maryland Department of Natural Resources GIS file. If the project progresses into preliminary planning and engineering these natural resources will need to be field verified, any other resources not included in the GIS mapping will need to be identified, and coordination with the environmental regulatory agencies will need to occur.

5. CONCLUSIONS

There are few environmental resources in the Bayview study area of significant concern. However, further environmental analysis will be needed as alignments are further developed to comply with the requirements of the National Environmental Policy Act and the Maryland Environmental Policy Act. The follow-up actions include:

- Continued coordination with Baltimore City and Johns Hopkins regarding alignments and future development projects in the study area.
- Public involvement and outreach efforts to the residents of the Greektown and Joseph Lee neighborhoods as well as businesses and industries in the study area.
- A site reconnaissance for hazardous materials will need to be conducted on any alignment carried forward to identify contaminated soils and groundwater. Remediation and site cleanup will be required for any impacted properties.
- Section 106 studies and coordination with the Maryland Historical Trust will need to be initiated to identify any standing historical structures or archeological resources in the study area.
- Coordination with the Maryland Department of Natural Resources and US Fish and Wildlife Service, and possibly Maryland Department of Environment US Army Corp of Engineers will be needed.

The environmental analysis by alignment is presented in the 'Potential Alignments and Stations' chapter of the main report.

II. HAZMAT SUMMARY TABLES

TABLE 1: HIGH RISK SITES

Site ID	Property	Address
3	L. Fishman & Sons, Inc.	6301 E. Lombard Street
4		5600 Lombard Street
8	Conrail Orangeville Yard	6000 E. Lombard Street
10	Kane & Lombard Street Drums	Kane & Lombard Streets
13	Norfolk Southern Corp. Orangeville Yard	4500 E. Fayette Street
15		61 Kane Street
17	Cambrex Bio Science Baltimore, Inc.	5901 E. Lombard Street
18		61 Kane Street
19		Kane & Lombard Streets
26	Patterson High School	100 Kane Street
31	Joseph Lee Playfield	5900 E. Pratt Street
36	Conrail	4790 E. Lombard Street
37	Conrail	4800 E. Lombard Street
81		4600 Gough Street
121	Scheib Auto Paint Residential Biscoe Property Society Cleaners and Dryers	5911 Eastern Avenue 5915 Eastern Ave 5900 Eastern Avenue 5920 Eastern Avenue
126	Crown Station	5801 Eastern Avenue
127	Pemco Products Bayer Corporation Mobay Chemical Corporation	5601 Eastern Avenue 5601 Eastern Avenue 5601 Eastern Avenue
134	Residential (3) Eastern Dry Cleaners NIH Research Center/Johns Hopkins Bayview Transflo Terminal Services, Inc.	505 S. Ponca 4907, 4921 Eastern Avenue 4905 Eastern Avenue 4940 Eastern Avenue 1525 Andre Street
188	 Cambridge Iron & Metal Co.	901 S. Kresson Street 901 S. Kresson Street
195	Baltimore Steel Drum Corp	910 S. Kresson Street
199	Malt Mill Building Dillon Corporation Brewers Hill East Association of Maryland Pilots	3701 Dillon Street 3701 Dillon Street 3701 Dillon Street 3720 Dillon Street
200	Struever Brothers National Bohemian Brewery	3601 Dillon Street 3601 Dillon Street
209	Brewers Hill East Gunther Brewery Exxon Terminal	3701 Dillon Street 3701 O'Donnell Street 3701 O'Donnell Street

210	Tulkoff Food Products Waddle Truck Equipment Inc.	1104 S. Conkling Street 1101 S. Conkling Street 3601-3607 O'Donnell Street 3607 O'Donnell Street
214	Gunther Brewery Tulkoff Warehouse	1211 S. Conkling Street 1200 S. Conkling Street
215	Gunther/Tulkoff	1011, 1211, 1221 S. Conkling Street
216		1301 S. Conkling Street
220	Exxon Refinery	3801 Boston Street
222	Exxon Prop	Boston & Ponca Streets
232	Exxon	3801 Boston Street 3801 Boston Street
233	Exxon Terminal	3801 Boston Street
Total High Risk Sites = 31		

TABLE 2: MODERATE RISK SITES

Site ID	Property	Address
6	Pies Corvette & Body Shop	6508 E. Lombard Street
12	Textile Chemical Co. Inc.	4501 E. Fayette Street
14	Soil Safe Inc.	4600 E. Fayette Street
24		5600 E. Lombard Street
28	United Oil Company, Inc.	4405 E. Baltimore Street
34	Johns Hopkins Bayview Research	4940 Eastern Avenue
38	Scully Rubber Manufacturing Co. Inc.	4504 E. Lombard Street
39	Scully Rubber Manufacturing Co. Inc.	4501 E. Lombard Street
42	Conrail Bayview Yard	Lombard & Oldham
43	Petroleum Services Inc.	4200 E. Lombard Street
47	Serv-u Inc.	120 S. Oldham Street
58	MTA – Eastern Bus Division	201 S. Oldham Street
68	PJAX Trucking	240 S. Kresson Street
70	J&L Equipment	250 Kresson Street
86	Triad Technology Center	333 Cassell Drive
90	Bay City Trucking	300 S. Kresson Street
97	Industrial (5)	231, 320 Kresson Street
110	Ingram Excavation Exxon Station Master Halco Anchor Fence Brady's Auto Care	504 S. Kane Street Eastern Avenue/Kane Street 6500 Eastern Avenue 6500 Eastern Avenue 2203A Defense Highway
111	Jefferson Smurfit-Stone Co. Container Corp. of America	6541 Eastern Avenue 6541 Eastern Avenue

113	Hydro Conduit Co. Amoco BP CRC Eastern LLC Home Depot Exxon RAS	6411 Eastern Avenue 6425 Eastern Avenue 6425 Eastern Avenue 6425 Eastern Avenue 6419 Eastern Avenue 6408 Eastern Avenue
122	Merit Oil Hess	5802 Eastern Avenue 5802 Eastern Avenue
130	DCW Contracting Inc JK Cabinet Inc. Piercy Inc. Vision Adhesive Craftsman Signs Mogul Corp. Fiberglass Specialties Crown Industrial Park	4400 Eastern Avenue 4401 Eastern Avenue 4401 Eastern Avenue 4401 Eastern Avenue 4401 Eastern Avenue 4401 Eastern Avenue 4401 Eastern Avenue 4401-4425 Eastern Avenue
136	Shaeffer & Strohminger Inc	520 & 620 Dundalk Avenue
137	Roxys Cleaners L&S Welding Company Residential (5) Maryland Service Garage	526 S. Oldham Street 526 S. Oldham Street 500 block S. Oldham Street 4801 Eastern Avenue 501-07 S. Oldham Street
158	Bruning Paint Company INSUL-X Products Corp.	601 S. Haven Street 601 S. Haven Street
171	Bruning Paint Co/Case Mason Filling Westwood Chemical Co. Inc. Aerosol & Liquid Packaging Inc.	715 S. Haven Street 715 S. Haven Street 715 S. Haven Street
176	Residential (3) Bob's Transportation & Storage Co. Inc. Key Warehouse Services Lever Industrial Company Cowan Transport Residential (4)	839, 837, 833 Oldham Street 820 S. Oldham Street 820 S. Oldham Street 820 S. Oldham Street 820 S. Oldham Street 800 block S. Oldham Street
179	Cowan Transportation	4600 Fait Avenue
185	Citgo Mobile Residential	909 Dundalk Avenue 909 Dundalk Avenue 903 Dundalk Avenue
197	Residential Overflo Warehouse Facility	3901 Dillon Street 3901 Dillon Street
205	INSL-X Products- Lenmar Div. Valu Foods Citgo Station	4701 O'Donnell Street 4701 O'Donnell Street 4700 O'Donnell Street
212	Royal Farms Store Mark Industries, Inc. Allied Environmental Group	1200-1300 Ponca Street 1200 Ponca Street 1200 Ponca Street
213	Crown Simplimatic Inc	1200 S. Newkirk Street

217	Harbor Manufacturing	1301 Baylis Street
224	Exxon	Newkirk & Boston Streets
227	Millville Quarry Baltimore Quality Assurance Opportunity Concrete Baltimore Dip Moldings, Inc. Bardon Inc.	4203 Boston Street 4200 Boston Street 4201 Boston Street 4200 Boston Street 4201 Boston Street
229	Model Machine Co. Inc. Vapors	1401 S. Haven Street Boston & Haven Streets
230		Boston & Conkling Streets
231	Harbor Enterprise Center American Can	3500 Boston Street 3500 Boston Street
234	St. Paul Lutheran Church Canton Crossing Dock Area Site	1415 Clinton Street 1410 S. Clinton Street 1400 S. Clinton Street
Total Moderate Risk Sites = 40		

TABLE 3: LOW RISK SITES

Site ID	Property	Address
1	Penn Pontiac	1 Kane Street
2	Herman Born & Sons	6804 Rolling Mill Road
5	Department of Transportation	6201 Lombard Street
7	Pastore's Inc.	6101 E. Lombard Street
16	Lambert Fabricators Inc.	4301 Fayette Street
20	Metrobuilt	140 N. Kresson Street
21		100 N. Janney Street
22	Resource Recovery of Maryland	113 N. Kresson Street
23	American Limousines, Inc.	4401 East Fairmount Avenue
25		27 & 33 N. Kresson Street
27	LUI Corp.	5500 E. Lombard Street
29		7 N. Janney Street
30		24, 27, 29 S. Kresson Street
32		17 S. Janney Street
33	Owens Illinois Plastics Products	201 Kane Street
35		47, 49 51 S. Kresson Street
40	Greens Inc.	110 S. Kresson Street
41		4302, 4300, 4306, 4325 E. Lombard Street
44	City Gas & Furnace Comp.	4113 E. Lombard Street
45	Eastwood Body Shop Georges Haven Street Autobody	113 S. Haven Street 107 S. Haven Street
46	Abbott J.J. Inc.	120 S. Janney Street

48	NIDA IRP	5500 Nathan Shock Dr.
49	Residential	301 Folcroft Street
50	Residential	322 Gusryan Street
51	Residential (15)	300 block Elrino Street
52	Residential	302, 303, & 313 Drew Street
53	Residential	5908 Pratt Street
54	Cross Wiping Materials Corp.	4201 E. Pratt Street
55	Our Lady of Fatima Church	6400 E. Pratt Street
56	Residential (8)	300 block Joplin Street
57	Chesapeake Machine Company	210 S. Janney Street
59		308 Kane Street
60	Residential (4)	218 S. Haven Street
61	Residential (6)	S. Folcroft Street
62		222 & 218 S. Oldham Street
63	Residential (5)	Drew Street
64	Residential (2)	335 & 329 Hornell Street
65	Residential (6)	300 block Imla Street
66	Residential	336 Kane Street
67	Residential (3)	354, 345, 341 Gusryan Street
69		325 Cornwall Street
71		355 & 356 Drew Street
72		363 Cornwell Street
73	Residential (3)	352, 343, 346 Cornwell Street
74	Kimball Tyler	261 S. Haven Street
75		353 Bonsal Street
76	Trans American Trucking Service, Inc.	401 Kane Street
77	Residential (3)	410, 409, 406 Joplin Street
78	Residential (2)	409, 404 Imla Street
79	Residential (20)	400 block Gusryan Street
80	Residential (8)	400 block Hornell Street
82	Residential (2)	314, 304 Oldham Street
83		418 Kane Street
84	Residential (7)	442 Folcroft Street
85	Residential (11) and 1 Commercial	300 block S. Newkirk Street
87	Residential (10)	300 block S. Macon Street
88	Residential (9)	300 block S. Lehigh Street
89	Residential (8)	400 block Bonsal Street
91		410, 408 Drew Street
92		401 Angelesea Street
93	Residential (4)	400 block Cornwell Street
94	Residential	431 Joplin Street
95		414 Elrino Street
96		334, 336 Oldham Street

98	Residential (3)	441, 431, 426 Drew Street
99	Residential (4)	426 Elrino Street
100	Residential (4)	400 block Hornel Street
101	International Petroleum of Maryland EDDCO Supply Company A-1 Plating Company Inc.	314 S. Haven Street 314 S. Haven Street 311 S. Haven Street 315 S. Haven Street
102	Residential (2)	443, 439 Elrino Street
103	Residential	453 Anglesea
104	Residential (7)	400 block S. Newkirk Street
105	Residential (9)	400 block S Lehigh Street
106	Setco Scenic Services, LLC Countertops & Vanities Inc. Taubman Properties Robertson A L Inc.	329 S. Kresson Street 315 S. Kresson Street 315 S. Kresson Street 325 S. Kresson Street
107	Residential (3)	400 block S. Oldham Street
108	Amoco	Eastern/I-95
109	Deubber Truck Company Associated Cargo Inc.	400 S. Janney Street 400 S. Janney Street
112	Monumental Supply Co. Inc.	401 S. Haven Street
114	Royal Farms #90 Eastern Auto Parts	6311 Eastern Avenue 6314 Eastern Avenue
115	Residential (2)	400 block S. Macon Street
116	Hydro-Conduit Home Depot	6315 Eastern Avenue 6315 Eastern Avenue
117	Residential	6206 Eastern Avenue
118	US Can Columbia Specialty Division	6301 Eastern Avenue
119	US Postal Service	6221 Eastern Avenue
120	Residential (6)	6000 block Eastern Avenue
123	Southeastern District Police Station BC Fire Department #124/Tower and Pump Station	5710 Eastern Avenue 5714 Eastern Avenue
124	Schaeffer and Stromminger Inc	Dundalk and Eastern Avenue
125	Johns Hopkins Hospital	5550Eastern Avenue
128	Residential (3) Residential (4) Chektec Corp.	516, 515, 508 Savage Street 5200 block Eastern Avenue 5210 Eastern Avenue
129	Luther Memorial Lutheran Church	5401 Eastern Avenue
131	Residential (9) Residential (4) Johns Hopkins Hospital/Bayview	500 block of Rappolla Street 5100 block of Eastern Avenue 5210 Eastern Avenue
132	Residential (4) Residential (5)	500 block Tolna Street 5300 block Eastern Avenue
133	Residential	5027 Eastern Avenue
135	Residential (5)	4500 block Eastern Avenue

138	Residential (5)	500 block S. Newkirk Street 4700 Eastern Avenue
139	Residential (9) Residential (7)	500 block S. Macon Street 4600 block Eastern Avenue
140	Residential (2)	500 block Quail Street
141	Residential (5)	500 block S. Lehigh Street
142	Apollo Warehousing, Inc. Wesport Axle Corp. Bohager Goodhues, Inc.	4301 Eastern Avenue 4301 Eastern Avenue 4315 Eastern Avenue
143	Residential Pete's Service and Auto Repair	502 S. Haven Street 4101 Eastern Avenue
144	Roy Rogers	530 Dundalk Avenue
145	Residential	515 Umbra Street
146	Circle Drive In Restaurant	555 Dundalk Avenue
147	Belt S Business Center United Steelworkers	600-608 Folcroft Street 540 Dundalk Avenue
148	Residential (2)	603, 600 Tolna Street
149	Residential (8)	600 block Rappolla Street
150	Residential (8)	600 block S. Ponca Street
151	Residential (4)	600 block Quail Street
152	Residential (4)	600 block Savage Street
153	Residential (5)	605, 604, 601 Oldham Street 4803, 4809 Fleet Street
154	Residential (9)	600 block S. Newkirk Street
155	Residential (12)	600 block S. Macon Street
156	Residential (2)	624, 627 Tolna Street
157	Residential (11)	600 block S. Lehigh Street
159	Enco Dundalk Corp.	603 Dundalk Avenue 603 Dundalk Avenue
160	Residential (5)	600 block S. Oldham Street
161	Jungfer Separators	610 S. Gusryan Street
162	US Customs	608 Folcroft Street
163	Residential (3)	717, 713, 705 Tolna Street
164	John Ruhrah Elementary Residential	701 S. Rappolla Street 700 S. Rappolla Street
165	Residential	714 Umbra Street
166	Residential	700 S. Ponca Street
167	Residential (12)	700 block S. Oldham Street
168	Cowan Brothers LLP	4701 Foster Avenue
169	Residential	722 Rappolla Street
170	Residential (4)	700 block Ponca Street
172		Intersection of Fait and Oldham Streets
173	Inmont Corp. Container Graphics Corp.	700 S. Kane Street 700 S. Kane Street
174	Residential	800 Rappolla Street

175	Residenital (2)	825, 817 Umbra Street
177		812 S. Quail Street
178	International UTS Property	4500 Fait Avenue
180	Residential (5)	800 block S. Ponca Street
181	Residential	6621 Hudson Street
182	Amoco Oil Co. Frankfurst Fleet Service	901 Dundalk Avenue 901 Dundalk Avenue
183	Residential (2)	825, 821 Tolna Street
184	BGE	5107 Fait Avenue
186	Residential (2) Former Station	922, 900 Ponca Street 901 Ponca Street
187	Residential Central Hiring Hall & Dispatch Steamship Trade Association	911 Oldham Street 900 Oldham Street 900 Oldham Street
189	Residential	931 Oldham Street
190	Residential	907 Fagley
191	Residential (2)	6603, 6607 Bushey Street
192	Residential (3)	914, 910, 906 S. Conkling Street
193	Residential	936 S. Conkling Street
194	Kirchner RC Co.	Haven and Dillon Streets
196	United Decorative Flower Inc.	4000 Dillon Street
198	Nerl Diagnostics	3800 Dillon Street
201	Monumental Supply Co.	1025 S. Haven Street
202	Second Chapter	1028 S. Conkling Street
203	Struever Brothers	3601 Dillon Street
204	Royal Farms Store	4820 O'Donnell Street
206	Residential	4624 O'Donnell Street
207		4300 O'Donnell Street
208	Crown Cork & Seal Co. Inc.	4200 O'Donnell Street
211	FAA Davis	1111 S. Ponca Street
218	Residential	3420 Toone Street
219	Residential (2)	3407, 3406 Toone Street
221	Former AHEPA Senior Housing Construction Site	1351 S. Clinton Street 1351 S. Clinton Street
223	Citgo Station	4700 Boston Street
225	Canton Trade Center	4600 Boston Street
226	Burns & Russell Co.	4230 Boston Street
228	Capitol MFG Co.	4109 Boston Street
235	Kaufman Electric Company	Boston Street & Highland Avenue
Total Low Risk Sites = 164		

APPENDIX C

I. EXISTING RAILROAD NETWORK

1. INTRODUCTION

The extension of Red Line to Bayview is a challenge due to the presence of a cluster of railroad tracks running north-south in a corridor between Haven and Ponca Streets. The railroad tracks and rights-of-way are owned by the Canton Railroad Company (CTN), CSX Transportation, Inc. (CSXT), and the Norfolk Southern Corp (NS) and feature a broad spectrum of railroad activity ranging from heavily-used tracks to abandoned rights-of-way. With one exception the active tracks see continual movements of trains and therefore cannot be crossed at grade. Further, any Red Line alignments parallel to the CSXT or NS tracks must be kept at least 25 feet from the centerline of the railroads' nearest operating track, per FRA regulations, to allow independent dispatching and movements.

In general, there are two active rail corridors in the study area. The western-most is a north-south corridor located between Haven Street and Oldham Street. It consists of three to five tracks owned by CTN and NS and one to two CSXT tracks, varying depending on location. The CTN tracks end between O'Donnell Street and Eastern Avenue, while the NS tracks continue, angle northeasterly and cross under the CSXT track north of Eastern Avenue. The eastern-most corridor, occupied by a single CTN track, runs north-south west of Ponca Street from Boston Street to O'Donnell Street, then turns generally eastward north of O'Donnell Street after crossing it at grade. Both corridors connect the traditionally industrial Canton waterfront area, the Dundalk and Seagirt Marine Terminals, and the former Mittal (Bethlehem) Steel plant at Sparrows Point with CSXT and NS freight yards and Amtrak's Northeast Corridor north of the Johns Hopkins Bayview Medical Center Campus. Train traffic in the two corridors consists solely of freight with no commuter or long distance passenger trains.

In addition to the active rail corridors there are two abandoned rights-of-way and one inactive right-of-way that appear to be suitable for location of a transitway. The first abandoned right-of-way is located between Conkling Street and CTN/NS rail corridor from Boston Street to a point north of O'Donnell Street. The second abandoned right-of-way is located north of Lombard Street between Haven Street and the CSXT right-of-way. The inactive NS right-of-way begins at the point where the active NS tracks angle northeasterly, as described above, and continues straight north to its former junction with Amtrak's Northeast Corridor near Monument Street.

2. OPERATIONS ON THE ACTIVE TRACKS

The CTN tracks are the two outermost tracks on the east and west sides of the 5-track portion of the CTN/NS corridor between Boston Street and O'Donnell Street. Both of these tracks are used several times per day, and CTN uses the three NS tracks to access its western-most track. The eastern-most CTN track terminates in the Cambridge Iron & Metal scrap processing facility north of O'Donnell Street. The western-most CTN track

currently ends at the former Bruning Paint facility at Haven and Foster Streets, then switches back and runs parallel to an abandoned NS right-of-way in a southwesterly direction to cross Haven Street and end in the Overflo Warehouse at Haven and Dillon Streets.

The NS tracks are the three tracks between the CTN tracks from Boston Street to north of O'Donnell Street. Between O'Donnell Street and Eastern Avenue a fourth track is added, and north of the point where the NS tracks cross under the CSXT track a fifth track is added. These tracks are the most active of all the tracks in either corridor. The increased number of tracks at the north end of the corridor reflects their use as the lead tracks for the NS Lombard Street Intermodal Terminal. When assembling and disassembling trains of containers, a process which goes on around the clock, NS will often pull the long cuts of cars as far south as O'Donnell Street in order to get enough clearance to throw a switch and push the cars back into a different track. NS typically sends two trains each day to and from the Dundalk Marine Terminal. These trains vary in length and usually stop to align switches to permit them to access the tracks that go to the Marine Terminal. NS also frequently sends a crew to switch several industries along the Canton waterfront. Like the Marine Terminal trains, these trains usually only pause in the corridor long enough to align switches to give them access to a particular running track. The most disruptive trains that use the NS tracks, however, are the 110-car coal trains whose destination is the Consolidation Coal Company export facility at the south end of the Canton waterfront. These trains attempt to minimize the time that they block the grade crossing at Boston Street by holding the trains clear of the crossing until all switches are aligned so that they do not have to stop once they are moving, though even when moving their speed is generally 5 – 10 mph. For trains bound to the export facility, this usually means that the train extends back as far as Lombard Street, and usually blocks the O'Donnell Street crossing. However, since O'Donnell Street traffic can access the O'Donnell Street Viaduct as an alternate route, blockage of this crossing is not considered as critical as blocking the Boston Street crossing. These trains are the principal reason that a Red Line transitway can not cross the railroads in this corridor at grade.

The CSXT track is probably the second-busiest in this corridor. Currently, this track provides access to the Seagirt Marine Terminal and the steel plant at Sparrows Point for CSXT. Typically, there is one train per day to and from Sparrows Point, though occasionally a unit train of imported coke is run as a second train. Marine Terminal trains can operate at any time, though beginning in the fall of 2007 this traffic may be reduced when a new CSXT container terminal near Chambersburg, PA, is scheduled to open.

The CTN track in the eastern-most corridor is probably the least-used of the tracks with CTN operating one train each way three or four days per week. There are a number of rail-served sites along Rolling Mill Road that currently are not using rail service, so there is some potential for traffic growth. However, traffic growth in this case would translate into slightly longer trains rather than more trains per day. The CTN has a 60-foot right-of-way along the portion of this corridor that would be used by the Red Line between

O'Donnell Street and the Pemco property. Since this right-of-way is not wide enough to maintain an FRA-mandated 25-foot horizontal separation between the transitway and an active railroad track, the Red Line operating plan will have to incorporate some provision for separation of freight and transit uses by time limits as is currently practiced on the Central Light Rail Line north of North Avenue.

3. POTENTIAL OF THE ABANDONED AND INACTIVE RIGHTS-OF-WAY

The abandoned NS right-of-way (formerly part of the President Street Track) between Conkling and Haven Streets is pivotal in providing a dedicated transitway from the end of the Red Line alternative that follows Boston Street to Haven Street and beyond. This study has assumed that all alignment options originating at Boston and Conkling Streets will utilize most or all of the right-of-way. Except for conversion of a short portion of this right-of-way to a parking lot east of Conkling Street, and use of the portion between Haven Street and the CTN/NS rail corridor as a materials storage area (possibly through lease from NS), it is unoccupied.

It appears that the abandoned CSXT right-of-way north of Lombard Street between the active CSXT tracks and the inactive NS right-of-way (formerly part of the Highlandtown Branch) may provide a viable alternative to placing the transitway in Lombard Street. The portion east of Kresson Street to the active CSXT right-of-way is still intact and was designed as a double track railroad right-of-way. The portion of this right-of-way from Kresson Street west to the inactive NS right-of-way has been purchased or leased from CSXT for use as a parking area for a small business. However, it is still free of building encroachments and property acquisition would be much easier than what will be required if the selected alignment option were to be the one operating in Lombard Street.

The inactive NS right-of-way could also play a pivotal role in threading the Red Line through this rail corridor. While owned by NS, the right-of-way is currently leased on an annual basis by CTN. CTN's interest in this right-of-way is the potential for future rail service to the H&S Bakery plant north of Baltimore Street and west of Haven Street. Since this right-of-way is not wide enough to maintain an FRA-mandated 25-foot horizontal separation between the transitway and an active railroad track, the Red Line operating plan will have to incorporate some provision for separation of freight and transit uses by time limits as is currently practiced on the Central Light Rail Line north of North Avenue.

II. EXISTING STREET NETWORK

1. INTRODUCTION

The extension of Red Line to Bayview Study Area has several street segments, which may be suitable for locating transit alignments. The major streets in the study area include the following:

- Eastern Avenue
- Lombard Street
- Boston Street
- O'Donnell Street
- Oldham Street
- Haven Street
- Ponca Street
- Kane Street

These existing roadway sections were evaluated for traffic, lane configurations, existing traffic signals, on-street parking and bus stops. On the basis of this analysis, some conclusions were drawn regarding the comparative suitability of these roadway segments to the location of transit alignments.

2. ANALYSIS

The description and analysis of the streets identified in the study area follows below.

Eastern Avenue (from Conkling Street to Bayview Boulevard)

Eastern Avenue is an east-west roadway and sections of this street west of Conkling Street have already been evaluated for the proposed Red Line Transit project. The posted speed limit is 25 miles per hour throughout the street unless otherwise mentioned. Eastern Avenue Rehabilitation is an ongoing project in the City's current Capital Improvements Program (CIP). This project will include removal and replacement of existing asphalt roadway surface, roadway base repairs, sidewalks repair and replacement, ADA ramps, pedestrian and street lighting, landscaping, pavement markings and signs. The following description, however, is based on existing conditions.

West of Conkling Street – Eastern Avenue has two lanes, one eastbound and one westbound. There is metered parking on both sides on the roadway. This segment of the street has 12-foot sidewalks on both sides. The street width is 42 feet curb to curb.

Conkling Street to Haven Street – This segment of the roadway has commercial activity on both sides of the road. There are two traffic lanes, one in each direction with metered parking on both sides of the road. The street measures 42 feet curb to curb. The street has sidewalks on both sides. The signalized intersections in this segment are located at Conkling, Eaton and Grundy Streets. The bus stops for eastbound route 10 bus are located at several locations including just west of Conkling Street, the southwest corner of Eaton Street intersection and at the southwest corner of Haven Street intersection. The bus stops for the westbound route 10 bus are located at several locations including just east of Conkling Street, northeast corner of Eaton Street intersection and at the northwest corner of Grundy Street intersection. The bus stops for eastbound route 22 are located at Haven Street.

Haven Street to Macon Street – This section of the Eastern Avenue roadbed dips and goes under (3) Heavy Rail Overpasses and (1) Roadway Overpass (Janney Street) before coming back up to grade at Macon Street. In this segment, there are elevated sidewalks on both sides of the roadway. The sidewalks are eight feet wide and have pipe handrails to protect pedestrians from the traffic lanes 6 to 8 feet below. Below the overpasses, the street width increases to 50 feet which includes a raised four-foot concrete median. Haven Street is the only signalized intersection in this segment. This segment of the roadway has no residential or commercial frontage and there are no bus stops in this segment.

Macon Street to Ponca Street – The roadway is 44 feet wide from curb to curb with two travel lanes, one in each direction in the base period with metered parking on both sides. During the morning and evening peak periods, there are four travel lanes, two in each direction. This segment of the roadway has sidewalks on both sides. In addition to the on-street parking, there is an off-street metered parking lot with 65 spaces, maintained by the City at Eastern Avenue and Ponca Street. The signalized intersections in this segment are located at Macon and Oldham Streets. The eastbound stops for routes 10 and 22 are located at southwest corner of intersection with Newkirk Street and at the southwest corner of intersection with Ponca Street .The westbound stops for routes 10 and 22 are located at the northeast corner of intersection at Macon Street and at the northeast corner of Ponca Street intersection.

Ponca Street to Quail Street – Between Ponca Street and Quail Street, there are four travel lanes, two in each direction. The roadway is 66 feet wide from curb to curb. On-street parking is permitted only on the south side of the street. There are sidewalks on both sides of the street. The speed limit is 35 miles per hour. This segment of the roadway has predominantly residential uses. The only traffic signal in this segment is located at Ponca Street. There are no eastbound bus stops in this segment. The only westbound stop is for the routes10 and 22, located on the northeast corner at the Ponca Street intersection.

Quail Street to Cassell Drive – The roadway is 84 feet wide in this segment with six travel lanes, three in each direction. The Johns Hopkins Bayview Medical campus is on the north side of this street segment and no parking is permitted on the north side. On-street parking is permitted on the south side. The south side of the street is lined with residences. There are 12-foot sidewalks on both sides of the roadway. The speed limit is 35 miles per hour. The bus stop for the eastbound 10 and 22 bus routes is located on the southeast corner at Rappolla Street intersection. There are no westbound stops in this segment.

Cassell Drive to Anglesea Street - In this segment, there are six travel lanes, three in each direction, with a raised median measuring four feet. The south side of the roadway has residential and commercial landuses. The north side of the roadway borders the Johns Hopkins Bayview campus. The posted speed limit in this segment is 35 miles per hour. There are sidewalks on both sides of the street. There is free, unrestricted parking on the south side of the street, whereas there is no parking permitted on the north side of the street. The signalized intersections are located at Cassell Drive and Bayview Boulevard. The eastbound bus stops for route 10 are located at southwest corner at Rappolla Street and at 150 feet east of Umbra Street. The westbound stops for route 10 are located at northwest corner at the intersection with Bayview Boulevard and the northeast corner at Cassell Drive intersection. The stops for the 22 line are located at Rappolla Street intersection, eastbound on the south side and the westbound on the north side of Eastern Avenue. The bus route 23 also runs along Eastern Avenue, but there are no stops in this segment.

Anglesea Street to Drew Street – This segment measures 84 feet from curb to curb with a 4feet wide median and six travel lanes, three in each direction. The sidewalks on both sides of the road

each measure 12 feet. A fourth lane develops where Eastern Avenue widens as one approaches Dundalk Avenue. Two of these four eastbound lanes veer off to the southeast onto Dundalk Avenue. There are commercial uses and business fronts both sides of the street. The posted speed limit in this segment is 35 miles per hour. There is no on-street parking on the south side of the street, whereas there is parking permitted on the north side of the street with the exception of one block - Anglesea Street to Bonsal Street. The signalized intersections are located at Anglesea and Bonsal Streets. A stop for the westbound routes10 and 23 buses exists on the northeast corner at Anglesea Street intersection while the stops for the eastbound routes 10 and 22 are located west of Anglesea Street and east of Cornwall Street.

Drew Street to Kane Street – The roadway is 64 feet wide from curb to curb with a 4-foot wide median and four travel lanes, two in each direction. On-street parking is permitted on both sides of the street. This segment has commercial uses on both sides of the street. The posted speed limit is 35 miles per hour. The signalized intersections in this segment are located at Drew, Gusryan and Kane Streets. The stop for the eastbound route 40 bus is located east of Dundalk Avenue whereas the stop for the westbound route 40 bus is located west of Elrino Street. The stops for the eastbound route 23 are located at Elrino, Gusryan, Hornel and Kane Streets. The stops for the westbound route 23 are located at Kane, Imla, Hornel and Elrino Streets.

Lombard Street (Haven Street to Bayview Boulevard)

West of Haven Street- This segment of the roadway has two travel lanes, one in each direction with sidewalks and parking on both sides of the street. The area is largely residential with some abandoned buildings and utility poles very close to the roadway.

Haven Street to Kresson Street –This segment of the street is 44 feet wide from curb to curb. There are two travel lanes, one in each direction during the base period. There is restricted parking on the south side of the street with no stopping between 7:00AM and 9:00AM and between 3:30PM and 6:00PM During this peak period there are two lanes eastbound and one lane westbound. The posted speed limit for this roadway segment is 25 miles per hour. This segment of the roadway has residential and commercial landuses. The only signalized intersections are at Haven St. and Kresson Street. The eastbound stops for routes 20 and 40 are located just east of Haven Street, while the only westbound stop for the 20 line is located east of Kresson Street.

Kresson Street to Bayview Boulevard – The posted speed limit in this segment of Lombard Street is 25 miles per hour from Kresson Street to Ponca Street then changing to 40 miles per hour between Ponca Street and Bayview Boulevard. The street width is 50 feet from curb to curb. There are four travel lanes, two in each direction. The roadway has a six-foot median that extends from Ponca Street to the east of Bayview Boulevard. This segment of the roadway has a sidewalk only on the south side of the street. There is no parking permitted on either side of the roadway. This segment of the street has industrial landuses on both sides. The signalized intersections are located at Kresson and Ponca Streets. The stop for eastbound route 20 are located on the southeast corner at intersection with Kresson Street and the westbound route 20 stop is located at northwest corner of Kresson Street intersection. The stops for route 23 are located on the southeast and northeast corners of the intersection with Ponca Street.

Bayview Boulevard to Kane Street – The street width in this segment is 44 feet from curb to curb with four travel lanes, two in each direction. There is no sidewalk on the north side and there is no parking permitted in this segment of the roadway. The posted speed limit is 40 miles per hour. Industrial landuses exist on both sides of the street. The signalized intersections in this

segment are located at Bayview Boulevard, Biosciences Facility and Kane Street. The Bus stops for the eastbound route 22 line is located on the south side of Lombard Street east of the Old Entrance to City hospital. The westbound stops are located on the north side of Lombard Street opposite the Old Entrance to City Hospital.

Boston Street (Conkling Street to Ponca Street)

Boston Street is an east-west roadway with a posted speed limit of 25 miles per hour throughout the segment unless otherwise stated. There are no bus routes on this segment of Boston Street.
West of Conkling Street – This segment of the roadway measures 74 feet from curb to curb and has four travel lanes, two in each direction with a raised median separating the eastbound and westbound lanes. There is recessed parking on both sides of the street.
Conkling Street to Haven Street – There are two travel lanes, one in each direction. The street width in this section is 40 feet curb to curb up to Eaton Street. About 135 feet east of Eaton Street the street width reduces to 36 feet curb to curb. There are sidewalks on both sides of the road but no parking is permitted in this section of the roadway. This segment of the roadway is characterized by heavy truck traffic and utility poles abutting the street right-of-way. Commercial and industrial landuses can be seen on either side of the street. There is one signalized intersection in this segment at Conkling Street.
Haven Street to Newkirk Street – In this segment of the roadway, there is an at-grade railroad crossing for five rail tracks. There are two travel lanes, one in each direction. There are no sidewalks and the shoulder is grass/dirt. There is no parking in this segment of the roadway. Industrial uses abut the street on both sides. There is heavy truck traffic and utility poles are placed very close to the travel lanes. There are no traffic signals in this segment.
Newkirk Street to Ponca Street – This segment of the roadway widens to accommodate two eastbound lanes and one westbound lane. All other conditions are same as the previous segment. There is a traffic signal at Ponca Street.

O'Donnell Street (Conkling Street to Ponca Street)

O'Donnell is an east-west street with a posted speed limit of 30 miles per hour.
West of Conkling Street – The roadway measures 42 feet from curb to curb and has two travel lanes, one in each direction with sidewalks on both sides of the street. Full-time parking is permitted on both sides of the street. There are residential uses on either side of the street. There are no bus stops in this segment.
Conkling Street to Newkirk Street – This segment of the roadway measures 50 feet from curb to curb with a 4 feet wide concrete median. There are four travel lanes, two in each direction. Parking is not permitted in this segment of the street. The sidewalk exists only on the north side. Industrial uses predominate in this area. There are no bus lines in this segment. Signalized intersections are located at Conkling and Macon Streets.
Newkirk Street to Ponca Street – The roadway measures 56 feet and has four travel lanes, two in each direction with a continuous left turn lane in the center. There are sidewalks on both sides of the street. There are no bus stops in this segment. There is a single track railroad crossing immediately east of Oldham Street and the traffic signals in this segment are located at Newkirk and Ponca Streets.

Oldham Street (Lombard Street to O'Donnell Street)

Oldham street is a north-south street with two traffic lanes one for each direction of travel. The area is primarily residential with a few commercial businesses and light industrial entities comprising chiefly of trucking companies. There are no bus routes on this section of Oldham Street.

Lombard Street to Eastern Avenue - The roadway is 44 feet wide from curb to curb with two travel lanes one in each direction. There are sidewalks on both side of the street. On-street parking is permitted full-time on both sides of the street. The land use in this street segment is chiefly residential on the west side with industrial uses on the east side of the street. There are no bus stops or traffic signals in this segment.

Eastern Avenue to O'Donnell Street – Oldham Street runs in the north-south direction and ends at O'Donnell Street in a T-intersection. There are two travel lanes, one in each direction. The street is 56 feet wide from curb to curb with sidewalks on both sides of the street. The posted speed limit on this street is 30 miles per hour. There are utility poles on the west side of the street and railroad tracks on the east side. On-street parking is permitted full-time on both sides of the street. There are residential uses on both sides of the street. There are no bus stops in this segment .The only signalized intersection in this segment is at Eastern Avenue.

Haven Street (Lombard Street to Boston Street)

Haven Street is a north-south street with a speed limit of 30 miles per hour in the entire segment unless otherwise mentioned. There are no bus stops in this segment.

North of Lombard Street – The roadway measures 50 feet in width from curb to curb with sidewalks on both sides. There are four travel lanes, two in each direction. There is full-time parking on the west side of the street whereas no parking is permitted on the east side. There are sidewalks on both sides of the street.

Lombard Street to Gough Street – The roadway measures 35 feet in width from curb to curb with sidewalks on both sides of the street. There are two travel lanes, one in each direction. Parking is permitted on the west side between Pratt Street and Gough Street but no parking is permitted on the east side. The landuses are either residential or industrial. There are no bus stops in this segment and the only signalized intersection is at Lombard Street.

Gough Street to Eastern Avenue – The roadway measures 34 feet from curb to curb in this segment with sidewalks on both sides of the street. There are two travel lanes, one in each direction. No parking is permitted in this segment of the roadway. The landuses in this segment are commercial and industrial. There is a signal at Eastern Avenue with left turn bay for the south to east movement. There is a Walgreens on the northwest corner at Eastern Avenue intersection and utility poles on the west side of the street.

Eastern Avenue to O'Donnell Street – The street width is 35 feet from curb to curb in this segment. There are two travel lanes one in each direction. Parking is permitted in a short portion of this segment only on the west side resulting in two metered spaces about 75 feet south of Eastern Avenue. In all other areas in this segment on-street parking is prohibited.

O'Donnell Street to Boston Street – There are two travel lanes, one in each direction. There are walkways on both sides but they are covered with gravel. The street measures 42 feet curb to curb however there is no parking permitted in this segment. The O'Donnell Street Bridge is elevated where it crosses over Haven Street. There are no traffic signals in this segment.

South of Boston Street – This is a two-way street with no street markings. There is a sidewalk on the east side whereas there is 90 degree head-in parking on the west side. The general area is characterized by industrial uses, heavy truck traffic and utility poles. There are no traffic signals in this segment.

Ponca Street (Lombard Street to Boston Street)

Ponca Street is a north-south roadway with a posted speed limit of 25 miles per hour throughout this segment.

Lombard Street to Eastern Avenue - This segment of Ponca Street is 44 feet in width with four lanes of traffic two for each direction. No parking is permitted in this segment. The area abutting this segment has commercial and industrial land uses. Traffic signals in this segment are located at New Ponca, Oldham and Lombard Streets. The bus stops for the northbound route 20 bus are located north of Eastern Avenue and north of Oldham Street. The stops for the southbound route 20 bus are located south of Lombard Street, south of Oldham Street and north of Eastern Avenue.

Eastern Avenue to O'Donnell Street– This segment of Ponca Street is 36 feet wide with two travel lanes, one for each direction of travel. The area is primarily residential with parking allowed on both sides of the street. The bus stops for the northbound 20 bus are located north of O'Donnell Street, south of Hudson Street, south of Fait Avenue and south of Foster Avenue. The stops for the southbound route 20 bus are located north of Foster Avenue, north of Fait Avenue and north of O'Donnell Street. The only signalized intersection in this segment is at Eastern Avenue.

O'Donnell Street to Boston Street – This section of Ponca Street is 52 feet wide with four travel lanes two for each direction of travel. Parking is restricted full time on both sides of the street. The adjacent land uses in this segment are industrial. The signalized intersections in this segment are at Boston Street and at O'Donnell Street. The northbound route 20 bus has two stops in this segment, one north of Ponca Street and one south of O'Donnell Street.

South of Boston Street – This section of Ponca Street has four travel lanes, two for each direction with a posted speed limit of 25 miles per hour. Parking is restricted full time on both sides of the street.

Kane Street (from Lombard Street to Dundalk Avenue)

Kane Street is a north-south roadway that is adjacent to residences, commercial interests and industrial land uses as well as a high school. The posted speed limit for this entire segment is 25 miles per hour. There is no bus route on this street; however there are many MTA school buses that serve the area high school south of Lombard Street.

North of Lombard Street – Kane Street has four travel lanes two for each direction with an additional northbound left turn lane at the intersection with North Point Road.

Lombard Street to Eastern Avenue – This segment is 44 feet wide and has four traffic lanes two for each direction. Parking is permitted in the non-peak hours on the west side of the street in front of the residences between Pratt Street and Eastern Avenue. Patterson High School has many MTA school bus stops in front of their facility south of Lombard Street and north of Pratt Street. Traffic signals in this segment are located at Lombard Street and at Eastern Avenue.

Eastern Avenue to Dundalk Avenue – This segment of Kane Street varies in width from 54 feet to 66 feet with painted left turn slots separating the north and south bound movements. There are only two through travel lanes one for each direction in spite of the overall width of the segment. There are no traffic signals in this segment. Land uses are commercial and industrial in nature. There is also an on-ramp to southbound I-95 in this segment.

3. CONCLUSIONS

O'Donnell and Boston Streets are the two southernmost streets in the study area. The uses in the general area around these streets are industrial in nature. This is accompanied by heavy truck traffic with few signals and poor road geometry in general such as lack of turning lanes and inadequate turning radius for trucks etc. Utility poles not only appear unpleasant, but also pose a traffic hazard since they are placed very close to the street right-of-way in most places. The traffic comprises of either commuters trying to get to downtown from I-95 and I-895 or trucks serving the industrial locations. These industrial locations are not popular destinations as of today. However, this is likely to change in future with the entire Canton/Fells Point area poised for major redevelopment. Lombard Street and Eastern Avenue are the two northernmost streets in the study area. Eastern Avenue is the main commercial spine within the area. The commercial establishments vary from grocery stores, restaurants, bars and other service-related establishments. Most bus routes run along Eastern Avenue. Lombard Street landuses are chiefly residential. The traffic in this area is characterized by cars and pedestrians with several origins and destinations being within this area. The residential units in the area vary from old, dilapidated and abandoned structures to newly renovated buildings. The residents in the area appear to belong to low- to low-medium income groups. From observation alone, there may be a significant percentage of people who are transit-dependant and/or who could benefit from improved mass transit in the area. The area appears to be struggling with change and could benefit from the presence of improved transit options.

There are four north-south streets in the study area including Haven, Oldham, Ponca and Kane Streets. Haven Street has primarily industrial uses and some residences whereas Ponca Street has primarily residential uses with parking on both sides of the street. Both Haven and Ponca Streets have limited ROW which makes them unsuitable for transit vehicles. Though Haven Street offers opportunities for minimal road-widening along the entire length of the roadway inadequate turning radii at intersections makes turn movements difficult especially for vehicles of any substantial length. Oldham Street measures 56 feet from curb to curb in the southern segment making it an option for a potential transit alignment. The street width narrows to 44 feet north of Eastern Avenue. This segment of the roadway has no residences or street front businesses on the east side and running a transit vehicle along the east curb would have no adverse impacts on the community. However, Oldham Street does not connect with Lombard Street and this may impact its suitability as a north-south connector. Kane Street is the only through north-south street east of the Bayview complex in the study area. Kane Street also connects to Dundalk Avenue making it suitable in the event of a potential extension of the Red Line to Dundalk. Kane Street has sufficient width and minimal on-street parking. For all these reasons, Kane Street may be considered for a possible transit alignment.

III. CITY OF BALTIMORE BICYCLE NETWORK

(Information in 1 through 3 and the map excerpted from the City of Baltimore Bicycle Master Plan, May 2006)

1. INTRODUCTION

The City of Baltimore Bicycle Master Plan (Bicycle Master Plan) was prepared in 2006 by the Department of Transportation, in cooperation with the Department of Planning. This plan complies with the strategic plan of Baltimore's Department of Transportation that calls for a "comprehensive and modern transportation system that integrates all modes of travel and provides mobility and accessibility in a convenient, safe and cost-effective manner." The Bicycle Master Plan identifies gaps in the system and recommends needed capital and operating investments to address these gaps.

2. GOALS & OBJECTIVES

***Goal 1*:** Develop a comprehensive network of facilities for bicycles
Objective 1: Make bicycling safe and inviting on the streets of Baltimore.
Objective 2: Increase the availability of bicycle parking and support facilities at destinations across the city.
Objective 3: Fully integrate bicycling with all public transit facilities and services.
Objective 4: Develop off-road paths to create a connected trail system.

***Goal 2*:** Implement safety, education and encouragement programs to increase bicycle usage.
Objective 1: Improve enforcement of traffic laws related to bicycling.
Objective 2: Educate the public (motorists, bicyclist, and pedestrians) about bicycle and vehicle operation in urban traffic conditions.
Objective 3: Encourage increased bicycling by promoting health, recreation, transportation, and tourist opportunities.

***Goal 3*:** Institute policies that support implementation of Bike Master Plan goals and objectives with community support and input.
Objective 1: Create structure to implement the Bike Plan goals and objectives.
Objective 2: Institute new policies and procedures in the Departments of Transportation and Planning to support Bike Master Plan goals.
Objective 3: Update street and trail repair and maintenance practices to ensure bicyclists safety and comfort.

3. IMPLEMENTATION

The Bicycle Network proposed in this plan is a 450-mile system of on-street and off-street bicycle facilities and routes. The on-street facilities include Signed Bicycle Routes, Intersection Improvements Off-Street Connectors and Bicycle Parking. The off-street facilities include multi-use trails, sidewalks, sidepaths and promenades. The on-street routes and connectors are organized into three groups and five priority Tiers as follows:

Introductory Network
Tier One - Top priority routes recommended for implementation in the near term.
Tier Two - Second priority routes recommended for implementation in the near term.

Medium Term Network Additions
Tier Three - Third priority routes recommended for implementation in conjunction with other planned roadway improvements.
Tier Four - Fourth priority routes recommended for implementation in conjunction with other planned roadway improvements

Projects with Variable Timing & Long Term Priorities
Tier Five - Most difficult projects to implement but sometimes provide routes key for a continuous and comprehensive network. Routes are recommended for further study to determine feasibility and implementation as overlap with other planned roadway projects occurs. Project timing will be determined by overall road way improvement needs and CIP scheduling. Most opportunities are likely to occur in 10-20 year timeframe, 2015-2025.

In the near term, 2006-2008, funding and implementation resources will be directed toward making the Introductory Network a reality.

4. IMPLICATIONS FOR THE RED LINE EXTENSION TO BAYVIEW

The Bicycle Master Plan proposes an aggressive program of on-street bicycle transportation improvements that will create an Introductory Network of bicycle facilities, see Figure C1. The Introductory Network comprises of several tiers based on priority of implementation. There are several street segments within the Red Line Extension to Bayview Study Area that are included in the Bicycle Master Plan's list of facilities that require improvements within Tiers One, Two and Three. The following street segments fall within the Study Area for the Red Line Extension to Bayview Feasibility Study:

Tier One	**Tiers Two & Three**
Eastern Avenue	Lombard Street
Aliceanna Street	O'Donnell Street
Dundalk Avenue	Boston Street
Mason Lord Drive	Haven Street
	Ponca Street

The Bicycle Master Plan identifies intersections in the Introductory Network which are locations in need of special consideration and treatments to provide greater safety to bicyclists. Some of these intersections fall within the Study Area. These are as follows:

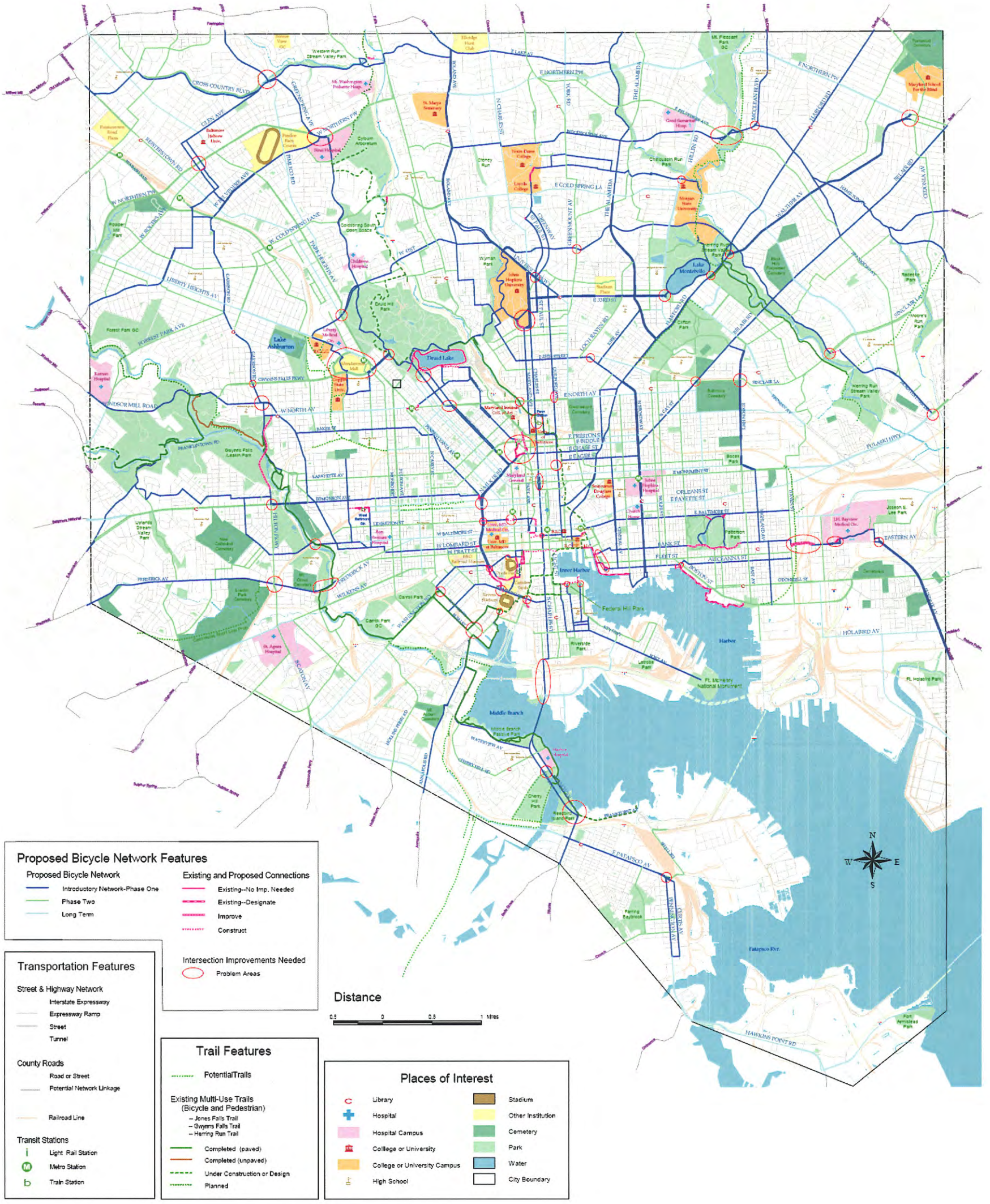
- Eastern Avenue – Dundalk Avenue – Cornwall Street – Drew Street
- Eastern Avenue – I-895 – Mason Lord Drive
- Eastern Avenue – Haven Street – Lehigh Street

According to the Bicycle Master Plan, these street segments and intersections within the Study Area are slated for improvements and treatments within the next few years. The Bicycle Master Plan, however, does not state the exact time, nature and extent of the improvements. The Red Line Extension to Bayview Feasibility Study has identified several alignment alternatives that will be located in the same area, street or intersection as these proposed improvements. At this preliminary stage, however, it is difficult to assess the exact nature of impacts of the transitway on the proposed improvements and vice-versa. In general, if a potential alignment alternative has impacts to traffic and/or on-street parking, it is likely to impact the proposed bicycle lanes and/or other facilities on that street.

Some of the alignment alternatives are recommended for early elimination from further consideration leaving six alignment alternatives that have been designated as being most feasible. A comprehensive assessment of these remaining alignment alternatives should take into consideration several factors including the impacts to existing and proposed bicycle routes and facilities. The Study has also identified potential station locations for the Red Line Extension to Bayview. The existing and proposed bicycle facilities such as bicycle routes, shared lanes and trails in the vicinity of these station locations must be taken into consideration at the time of detailed design and analyses. Wherever feasible the stations' design should include bicycle racks and lockers. This will make transit more attractive for bicyclists and in turn help ridership on the Red Line system.

The Bicycle Master Plan also includes a list of off-street facilities which includes 'Potential Trails and Extensions'. This includes the East Baltimore Rail Trail (N-S Trail, East of Haven Street) from Monument Street to Boston Street, shown in the Figure C1. The proposed East Baltimore Rail Trail would run along the inactive Norfolk-Southern/Canton Railroad right-of-way up to O'Donnell Street. South of O'Donnell Street the proposed trail follows the abandoned Norfolk-Southern Railroad right-of-way. One of the guidelines of this Study was to use existing railroad or roadway corridors where possible. With the exception of the Eastern-Fleet Alignment, all other alignment alternatives utilize at least a part of the inactive Norfolk-Southern/Canton Railroad right-of-way. All alternatives that begin at Boston Street use the same railroad right-of-way as the Haven Street potential trail as shown in the Bicycle Master Plan. This right-of-way is not wide enough to maintain the FRA-mandated 25-foot horizontal separation between the transitway and an active railroad track. Therefore the transit operating plan will have to incorporate separation of freight and transit uses by time. The right-of-way varies between 66' and 82' in width. This is wide enough to accommodate the transitway and the proposed trail with a suitable buffer between the two. The exact width of the trail and suitable buffer dimensions must be taken into consideration at the time of detailed design and analyses of the alignment alternatives.

FIGURE C1: CITY OF BALTIMORE BICYCLE NETWORK – BALTIMORE BICYCLE MASTER PLAN PHASES 1 - 3



APPENDIX D

RED LINE EXTENSION TO BAYVIEW
FEASIBILITY STUDY

Order of Magnitude Cost Estimates (MILLIONS)
2007 Dollars

Alignment Name	At-Grade		Retained Fill		Cut-and-Cover		Bored Tunnel		Flyover Approach		Aerial/Flyover		Bridge over Road		At-Grade Station		Underground Station		Construction SUBTOTAL	Const. Mgmt.	Design	TOTAL
	Length	$M/Mile	Length	$M/Mile	Length	$M/Mile	Length	$M/Mile	Length	$M/Mile	Length	$M/Mile	Length	$M/Mile	#	$M/Each	#	$M/Each	$M (40% Cont.)	$M (12.5%)	$M (8%)	$M
Pemco Alignment	0.85	$30.0		$45.0	0.42	$100.0	0.13	$100.0		$65.0		$85.0		$70.0	2	$0.5		$35.0	$113.1	$14.1	$9.0	**$136.3**
Oldham Alignment	1.06	$30.0		$45.0	0.34	$100.0	0.17	$100.0		$65.0		$85.0		$70.0	2	$0.5		$35.0	$117.2	$14.6	$9.4	**$141.2**
Greektown Alignment	0.98	$30.0		$45.0		$100.0		$100.0	0.11	$65.0	0.39	$85.0		$70.0	2	$0.5		$35.0	$99.2	$12.4	$7.9	**$119.6**
Haven Alignment	1.08	$30.0		$45.0	0.21	$100.0	0.41	$100.0		$65.0		$85.0		$70.0	2	$0.5		$35.0	$133.4	$16.7	$10.7	**$160.8**
Crown East Alignment	0.91	$30.0	0.54	$45.0		$100.0		$100.0	0.23	$65.0	0.84	$85.0		$70.0	3	$0.5		$35.0	$194.5	$24.3	$15.6	**$234.4**
Crown West Alignment	0.85	$30.0	0.60	$45.0	0.45	$100.0	0.47	$100.0		$65.0		$85.0		$70.0	2	$0.5	1	$35.0	$253.6	$31.7	$20.3	**$305.6**
Canton Railroad Alignment	1.27	$30.0	0.60	$45.0	0.27	$100.0	0.25	$100.0		$65.0		$85.0		$70.0	2	$0.5		$35.0	$163.9	$20.5	$13.1	**$197.5**
Central Alignment (from Boston Street)	1.40	$30.0	0.54	$45.0		$100.0		$100.0	0.11	$65.0	0.41	$85.0		$70.0	3	$0.5		$35.0	$154.7	$19.3	$12.4	**$186.4**
Lombard Alignment (from Boston Street)	2.44	$30.0		$45.0		$100.0		$100.0		$65.0		$85.0	0.11	$70.0	3	$0.5		$35.0	$115.7	$14.5	$9.3	**$139.4**
Kresson A Alignment (from Boston Street)	1.66	$30.0	0.28	$45.0		$100.0		$100.0	0.11	$65.0	0.49	$85.0		$70.0	3	$0.5		$35.0	$158.5	$19.8	$12.7	**$191.0**
Kresson B Alignment (from Boston Street)	1.66	$30.0	0.46	$45.0		$100.0		$100.0	0.11	$65.0	0.40	$85.0		$70.0	3	$0.5		$35.0	$158.9	$19.9	$12.7	**$191.5**
Kresson C Alignment (from Boston Street)	1.85	$30.0		$45.0		$100.0		$100.0	0.11	$65.0	0.34	$85.0		$70.0	2	$0.5		$35.0	$129.9	$16.2	$10.4	**$156.6**
Northern Alignment (from Boston Street)	1.80	$30.0	0.28	$45.0		$100.0		$100.0	0.11	$65.0	0.47	$85.0		$70.0	3	$0.5		$35.0	$161.8	$20.2	$12.9	**$195.0**
Eastern-Fleet Alignment	0.51	$30.0		$45.0	0.21	$100.0	0.42	$100.0		$65.0		$85.0		$70.0	1	$0.5		$35.0	$109.8	$13.7	$8.8	**$132.3**
Central Alignment (from Eastern-Fleet)	0.86	$30.0	0.54	$45.0		$100.0		$100.0	0.11	$65.0	0.41	$85.0		$70.0	2	$0.5		$35.0	$131.4	$16.4	$10.5	**$158.3**
Lombard Alignment (from Eastern-Fleet)	1.90	$30.0		$45.0		$100.0		$100.0		$65.0		$85.0	0.11	$70.0	2	$0.5		$35.0	$92.3	$11.5	$7.4	**$111.2**
Kresson A Alignment (from Eastern-Fleet)	1.12	$30.0	0.28	$45.0		$100.0		$100.0	0.11	$65.0	0.49	$85.0		$70.0	2	$0.5		$35.0	$135.3	$16.9	$10.8	**$163.0**
Kresson B Alignment (from Eastern-Fleet)	1.13	$30.0	0.46	$45.0		$100.0		$100.0	0.11	$65.0	0.40	$85.0		$70.0	2	$0.5		$35.0	$135.7	$17.0	$10.9	**$163.5**
Kresson C Alignment (from Eastern-Fleet)	1.31	$30.0		$45.0		$100.0		$100.0	0.11	$65.0	0.34	$85.0		$70.0	1	$0.5		$35.0	$106.7	$13.3	$8.5	**$128.6**
Northern Alignment (from Eastern-Fleet)	1.26	$30.0	0.28	$45.0		$100.0		$100.0	0.11	$65.0	0.47	$85.0		$70.0	2	$0.5		$35.0	$138.6	$17.3	$11.1	**$167.0**

NOTE: Vehicleand Yard & Shop costs are not included and may not be needed as they would be part of the Red Line. Right-of-Way costs also are not included, although some costs would be incurred.

Appendix F
Alternatives Technical Report, April 18, 2008

RED LINE
Corridor Transit Study

ALTERNATIVES TECHNICAL REPORT
Red Line Corridor Transit Study

April 18, 2008

PREPARED BY:
MARYLAND TRANSIT ADMINISTRATION
FOR U.S. DEPARTMENT OF TRANSPORTATION /
FEDERAL TRANSIT ADMINISTRATION

MTA Maryland

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I. Introduction

I. INTRODUCTION

This technical report of the Alternatives Analysis/Draft Environmental Impact Statement (AA/DEIS) describes the alternatives and options being considered for the Red Line Corridor Transit Study. This technical report documents the alternatives evaluation process from the preliminary screening of alignments to the alternatives and options that will be evaluated in the DEIS.

Chapter I of this technical report presents the Project History and Project Purpose and Need. Chapter II presents the Preliminary Screening of Conceptual Alignments. In Chapter III the other alignments that were eliminated based on further analysis after the November 2005 Workshops are described. Chapter IV presents the alignments considered and eliminated in the Bayview Feasibility Study prior to incorporating Bayview into the Red Line Study. The final chapter, Chapter V, presents the alternatives and options that have been retained for detailed study in the AA/DEIS. Appendix A of this technical report, includes the Limits of Disturbance Plans, and Tunnel Profiles. These drawings show the limits of work and impacts at a street level for every option under consideration.

A. PROJECT HISTORY

The 2002 *Baltimore Regional Rail System Plan* recommended a 109-mile Regional Rail System with 66 new miles added to the existing 43 miles of Metro Subway and Light Rail lines. The finished system could have as many as 122 stations, including 68 new stations in addition to the 54 stations that exist now. The Red Line Study was identified as one of the priority projects for the Plan's implementation.

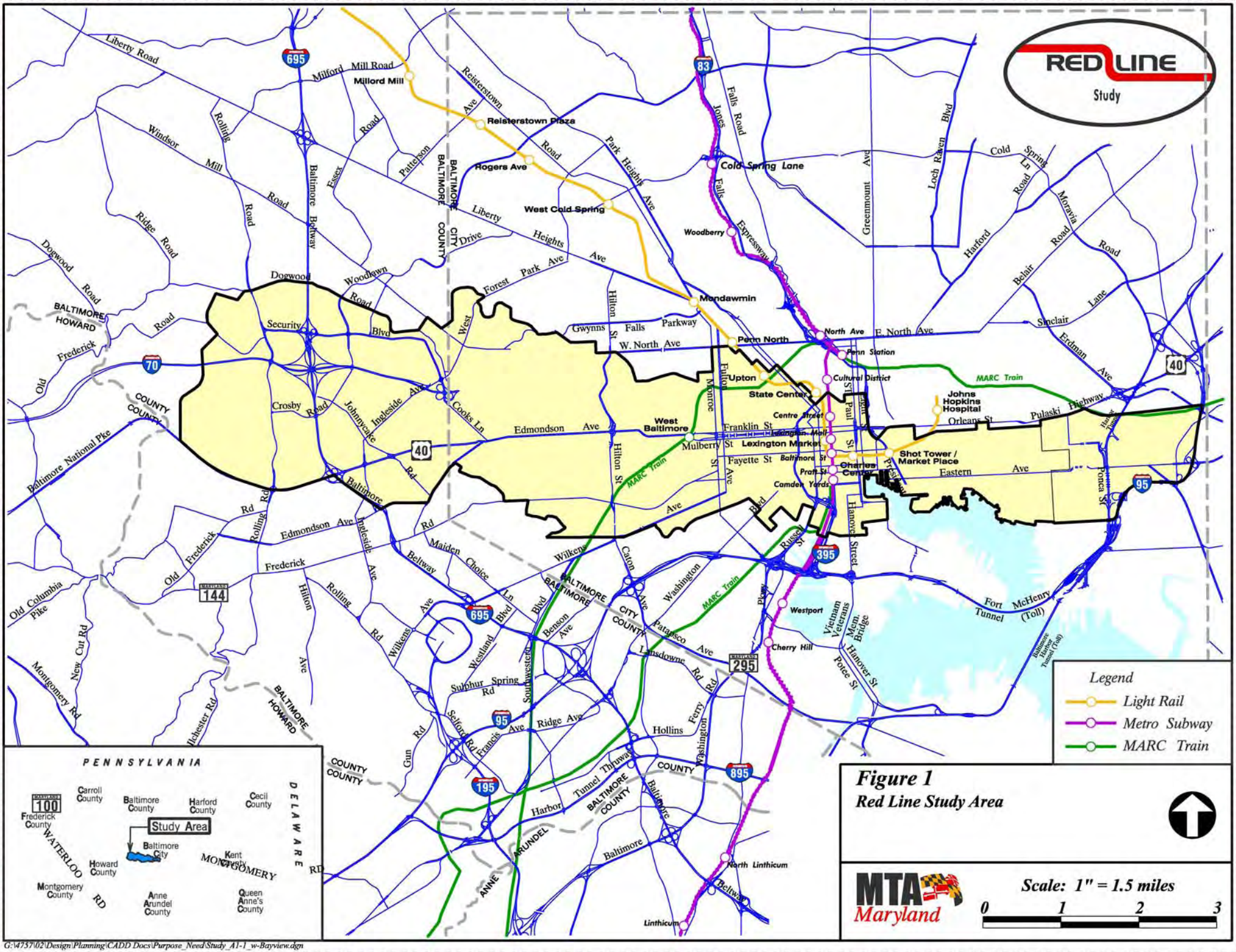
B. PROJECT PURPOSE AND NEED

The purpose of the Red Line Corridor Transit Study is to examine and evaluate alternative levels of investment in transportation improvements in an approximately 14-mile corridor of the Baltimore region, from the Centers for Medicare and Medicaid Services (CMS) and Social Security Administration on the west to the Johns Hopkins Bayview Medical Center on the east (**Figure 1**). The objectives of this transit project are to improve transportation choices for people in the Baltimore region, improve efficiency of the current transit system, and help address the region's air quality issues. The Red Line Study is also intended to encourage economic development and transit-oriented development at planned locations along the corridor. The AA/DEIS for the Red Line examines potential solutions for addressing mobility issues within the east-west transit corridor.

The Baltimore region faces a number of challenges that support the need for addressing transportation improvements in the corridor, including:

- Current and future congestion and travel time,
- Mobility and access to major activity centers,
- Transportation choices for east-west commuting,
- Connectivity between transit modes,
- Community revitalization and development, and
- Air quality concerns.

Refer to Chapter 1 of the AA/DEIS, Purpose and Need, for a detailed explanation of the study's proposed actions and transportation challenges in the Red Line Corridor. Furthermore, the Red Line Corridor Transit Study assesses how successfully each transit alternative addresses these challenges.



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II. Preliminary Screening of Conceptual Options

II. PRELIMINARY SCREENING OF CONCEPTUAL ALIGNMENTS

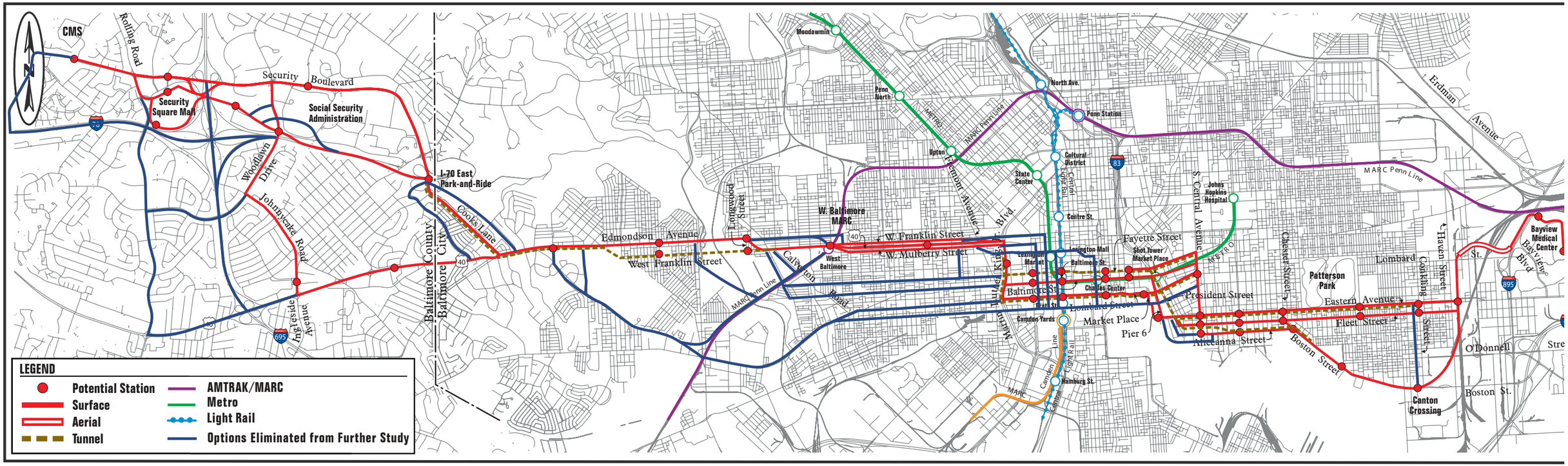
A range of alignments was identified for transit improvements within the Red Line Corridor. These alignments were screened based on preliminary technical analysis to reduce the number of alignments under consideration. This screening process considered such factors as: engineering, costs, environmental impacts, mobility and operation, and reduced accessibility. The following section describes the methodology and evaluation measures used to screen the preliminary alignments and then describes the eliminated alignments and reasons why these alignments were eliminated from further consideration. The eliminated alignments are depicted in **Figure 2** in relation to the alignments that are still under consideration.

A. METHODOLOGY

Evaluation measures were selected to compare the various advantages and disadvantages of each alignment and used for the preliminary screening for the entire Red Line corridor. The measures are also consistent with criteria prescribed in the FTA Project Justification Rating and Evaluation categories (*i.e.,* New Starts) and the Red Line Corridor project goals stated in the Purpose and Need. The table on the next page summarizes the definitions for the evaluation measures and how the measures relate to the evaluation criteria.

Various alignments in the study area were evaluated and compared. For certain evaluation measures, some alignments were determined to have appreciable benefit or advantage when compared to other alignments over the same geographical area. Those alignments with less benefit were eliminated from further study for reasons discussed in the next section.

FIGURE 2- OPTIONS ELIMINATED FROM FURTHER STUDY



Note the following options have also been eliminated but are not reflected on the map above:

- Southside of Security Square Mall to southside of Security Boulevard
- Southside of Seucrity Boulevard from CMS to Rolling Road (BRT)
- US 40/ Edmondson Avenue and Franklin Street Tunnel segment
- Fremont Avenue (surface)
- Baltimore Street/Fayette Street Transit Couplet segment east of Schroeder Street
- Shorter downtown tunnel
- President Street (surface)
- Eastern Avenue two-way transit segment
- Canton Loop segment

Table 1: Evaluation Criteria and Measures Used in Preliminary Screening

Project Goals (from Purpose and Need)	**FTA Evaluation Categories**	**FTA Project Justification Rating Categories** (New Starts)	**Evaluation Criteria**	**Evaluation Measures – *Unit of Measurement***	**Evaluation Measure Definition**
Cost Effectiveness			Engineering Issues	Meets Design Criteria – *Yes or description of how criteria not met*	The alternative preliminarily meets the preferred design criteria established for the mode evaluated. Any design criteria which approached the minimum parameters or exceeds it are identified.
			Capital Costs	Preliminary Estimate - *millions*	A high and low range of costs per mile was applied to tunnels, at-grade and aerial alignments for both BRT and LRT guideways. For the alignments under consideration, the measured length of each type of construction was developed in a CADD file using City and/or County mapping, stationed along actual curvature and tangents. For tunnel alignments, profiles were developed to determine length, and the tunnel length was measured from portal to portal, without regard to whether the tunnel is bored or cut-and-cover.
Support Community Revitalization and Economic Development	Impacts and Equity	Transit-Supportive Land Use	Population Served	2000 Population within ¼-mile of Alignment - *number*	Developed from Baltimore City/County 2000 census data.
				2025 Population within ¼-mile of Alignment - *number*	Developed from Baltimore Metropolitan Council forecasts.
			Access to Transit	Minority Population within ¼-mile of Alignment - *Percentage*	Developed from Baltimore City/County 2000 census data.

Project Goals (from Purpose and Need)	**FTA Evaluation Categories**	**FTA Project Justification Rating Categories** (New Starts)	**Evaluation Criteria**	**Evaluation Measures – *Unit of Measurement***	**Evaluation Measure Definition**
Support Community Revitalization and Economic Development	Impacts and Equity	Transit-Supportive Land Use	Access to Transit	Low-Income Population within ¼-mile of Alignment - *Percentage*	Developed from Baltimore City/County 2000 census data. The percentage is based on the number of people living in the household, however the measure to determine low-income is based upon the total household income being at or below the national poverty level as established by HUD. This national poverty level is $18,000 for a household of four.
			Employment Served	2000 Population Living within ¼-mile of Alignment Who Are Employed - *Number*	Developed from Baltimore City/County 2000 census data.
				2025 Population Living within ¼-mile of Alignment Who Are Employed - *Number*	Developed from Baltimore Metropolitan Council forecasts.
				2000 Jobs within ¼-mile of Alignment - *Number*	Developed from Baltimore City/County 2000 census data.
			Neighborhood Structure	Activity Centers within ¼-mile of Alignment (Neighborhood Shopping Center (and larger), Entertainment District/Tourist Attractions, and Institutions (schools, hospitals, etc.))	All activity centers within the ¼ mile buffer created for each alignment within a given alignment were counted. Activity centers include all neighborhood shopping centers (and larger), entertainment districts, tourist attractions, institutions such as schools, hospitals, etc.
				Significant Barrier to Walkability/Access - *Yes/No*	Existing conditions were examined for barriers that would prevent access to the alignment, not specific station locations. Items such as freeways, railroads, as well as natural barriers such as water or steep slopes were considered if they were in the path of potential walking patrons towards the alignment. For the purposes of an equitable evaluation between alternatives, proposed designs in which to overcome the barrier were not taken into consideration.

Project Goals (from Purpose and Need)	**FTA Evaluation Categories**	**FTA Project Justification Rating Categories** (New Starts)	**Evaluation Criteria**	**Evaluation Measures – *Unit of Measurement***	**Evaluation Measure Definition**
Support Community Revitalization and Economic Development	Impacts and Equity	Transit-Supportive Land Use	Neighborhood Structure	Potential for Stations (*i.e.,* Quantity and Quality of Access) - *Low/Medium/High*	Station potential was determined by the potential quantity of stations along a given alignment within an alignment as well as the overall quality of access to any potential alignments.
				Housing Density within a ¼-mile of Alignment – *Average # of Dwelling Units per Acre*	Developed from Baltimore City/County 2000 census data.
			Development Opportunity	Presence of Empowerment Zones/Enterprise Zones/SNAPs/Revitalization Districts within a ¼ mile of Alignment – *Yes/No*	Determination of any tax-benefit zones within the area of the alignment.
				Potential for Development within a ¼-mile of Alignment – *Low/Medium/High*	The potential for development was ranked as low/ medium/high based upon the number of planned, yet not approved, developments. This included residential plans, commercial plans, etc. In addition, the presence of master planning efforts was taken into account. This information was provided by Baltimore County, Baltimore City Planning Departments, and through internet research of the region.
				Approved development - *Square footage or number of units of new office and retail, number of new residential units within ¼-mile of alignment*	Pipeline and other approved development as provided by Baltimore County and Baltimore City Planning Departments.
			Transit-Oriented Development (TOD) Opportunity	Potential Sites for TOD and Renaissance Opportunities - *Number*	Potential sites were identified based on input from public agencies and field reconnaissance. Potential sites were included if there is an availability of land, either vacant or under-utilized, that may constitute a significant “critical mass” if redeveloped.

Project Goals (from Purpose and Need)	**FTA Evaluation Categories**	**FTA Project Justification Rating Categories** (New Starts)	**Evaluation Criteria**	**Evaluation Measures – *Unit of Measurement***	**Evaluation Measure Definition**
Environmental Stewardship	Impacts and Equity	Environmental Benefits	Cultural Resources	Historic Districts within Area of Potential Effect (APE) (w/ elevated sensitivity) - *Number*	The Historic District included all previously identified resources. The Area of Potential Effect (APE) was defined as either 250 feet on each side of the center line (in areas of higher urban density east of the Gwynns Falls) or 500 feet on each side of the center line (in areas of lower urban density west of the Gwynns Falls). Districts along tunnel sections were included due to potential secondary surface impacts.
				Individual Historic Properties within APE (w/ elevated sensitivity) - *Number*	The historic properties included all previously identified resources as well as those identified during the Red Line survey which were deemed likely to be found eligible for the National Register of Historic Places. The APE for historic properties was defined as either 250 feet on each side of the center line (in areas of higher urban density east of the Gwynns Falls) or 500 feet on each side of the center line (in areas of lower urban density west of the Gwynns Falls). Properties along tunnel sections were included due to potential secondary surface impacts. The analysis also provided a count of resources of elevated historic sensitivity (for example National Historic Landmarks, historic religious properties and cemeteries).
				Known Archeological Resources within APE - *Number*	Known archeological sites within 100 feet on each side of the alignment center line were included Area of Potential Effect (APE) along each alignment were included in this measure Resources along tunnel sections were also included due to potential secondary surface impacts.

Project Goals (from Purpose and Need)	**FTA Evaluation Categories**	**FTA Project Justification Rating Categories** (New Starts)	**Evaluation Criteria**	**Evaluation Measures – *Unit of Measurement***	**Evaluation Measure Definition**
Environmental Stewardship	Impacts and Equity	Environmental Benefits	Parks and Recreational Facilities	Potentially Impacted Urban Lots - *Number*	Impacts to parkland were evaluated for inventoried parkland properties within 500 feet of the BRT and LRT alignments having the potential for a direct right-of-way use of the property (bisect or edge impact); or, the potential for a Section 4(f) constructive use of the property (proximity impact) related to potential noise, visual, access, or vibration impacts that require further evaluation. These evaluators were applied for the tunneling alternatives, however, it was noted that Section 4(f) impacts would apply only if the tunneling causes disruption which would harm the purposes for which the park or recreation was established.
				Potentially Impacted Passive Parks - *Number*	
				Potentially Impacted Play Lots - *Number*	
				Potentially Impacted Regional Parks - *Number*	
				Potentially Impacted Open Spaces - *Number*	
			Noise	Potential for Impact to Receptors along Alignment (houses, churches, hospitals, parks, etc.) – *Low/Medium/High*	The noise parameter (low, medium, high) describes the overall impact on ambient noise levels.
			Wetlands	Type (Potential for Impacts) – *Number and Quality*	Impacts to wetlands and waters of the United States were approximated by examining project mapping, National Wetland Inventory Mapping (NWI) and Maryland Department of Natural Resources (DNR) GIS information. Quality of the wetland resource was based upon best professional opinion and field reconnaissance.
			Streams	Crossing(s) – *Linear Feet*	Only naturally intact streams were evaluated. Streams which have been piped beneath urbanized areas were not evaluated because they are unregulated.

Project Goals (from Purpose and Need)	**FTA Evaluation Categories**	**FTA Project Justification Rating Categories** (New Starts)	**Evaluation Criteria**	**Evaluation Measures – *Unit of Measurement***	**Evaluation Measure Definition**
Environmental Stewardship	Impacts and Equity	Environmental Benefits	Forests	Crossing(s) - *Linear Feet*	Impacts to forested areas were estimated by examining project mapping and recent aerial photography and calculating linear feet of forested area along alignment center line.
			100-Year Floodplains	Crossing(s) - *Linear Feet*	Floodplain impacts were estimated by examining project mapping and GIS information containing the Federal Emergency Management Agency (FEMA) 100-year floodplain mapping.
			Hazardous Material Sites	Potential Sites (Potential Risk) – *(low, moderate, severe)*	The identification of potential sites and estimation of the potential risk is based on MDE and EPA databases of properties with regulatory actions and, where allowed, review of the MDE files for the property. All sites designated as moderate or severe risk of contamination are sites with documented soil and/or groundwater contamination that are located adjacent to or upgradient from the alignment. Excavation, especially deeper excavation, near these sites presents a risk that contaminated materials would be encountered that will require special management and disposal procedures, resulting in some degree of increased construction cost.
			Rare, Threatened & Endangered Species Habitat	Area of Potential Habitat - *Acres*	Rare, Threatened and Endangered Species (RTE) habitat impacts were estimated by examining the DNR GIS information which displays a polygon on any location known as RTE habitat based on recent and historical records.

Project Goals (from Purpose and Need)	**FTA Evaluation Categories**	**FTA Project Justification Rating Categories** (New Starts)	**Evaluation Criteria**	**Evaluation Measures – *Unit of Measurement***	**Evaluation Measure Definition**
Improve Transit System Connectivity	Effectiveness	Mobility and Operating Efficiencies	Intermodal Connections	Connection to Existing Metro, MARC or Light Rail – *Yes/No/Not Applicable (N/A)*	Determination of the alignment within an alignment connecting to an existing rail transit line. The quality of the connection is assessed high/medium/low based on the approximate walking distance for the transfer.
				Existing Bus Routes along Alignment – *Yes/No/Not Applicable (N/A)*	Determined through MTA bus schedules.
				Buses on Bus Routes along Alignment- *Number per day*	Determined through MTA bus schedules and operations.
				Existing Bus Routes Intersected - *Number*	Determined through MTA bus schedules.
				Buses on Intersecting Bus Routes – *Number per day*	Determined through MTA bus schedules and operations.
				Estimated Transit Travel Time - *minutes*	A general spreadsheet based model that accounts for acceleration/deceleration of vehicles, station stops, and intersections.
				Potential Location along the Alignment for a Major Park & Ride Lots – *Yes/No*	Potential for a regional park & ride to be built within the alignment.
				Existing Pedestrian Level of Service (LOS) along Alignment	Level of service for pedestrian facilities as provided by BMC.
				Existing Bicycle LOS along Alignment	Level of service for bicycle facilities/roadways as provided by BMC.
				Access to Existing/Planned Bicycle Trails along Alignment – *Yes/No*	Potential access to planned facilities as provided by Baltimore County, Baltimore City Planning Department, and internet research.

Project Goals (from Purpose and Need)	**FTA Evaluation Categories**	**FTA Project Justification Rating Categories** (New Starts)	**Evaluation Criteria**	**Evaluation Measures – *Unit of Measurement***	**Evaluation Measure Definition**
Improve Mobility, Efficiency and Accessibility	Effectiveness	Mobility and Operating Efficiencies	Transit Dependency	2000 Zero-Car Households within ¼-mile of Alignment - *Number*	Developed from Baltimore City/County 2000 census data.
				2000 Households within ¼-mile of Alignment - *Number*	Developed from Baltimore City/County 2000 census data.
				2000 Senior Citizens within ¼-mile of Alignment - *Number*	Developed from Baltimore City/County 2000 census data.
				2000 School-Aged Children within ¼-mile of Alignment - *Number*	Developed from Baltimore City/County 2000 census data.
			Traffic Characteristics	Intersections (signalized and unsignalized) along Alignment - *Number*	Field verification of the total number of intersections that a given alignment would cross within the alignment length.
				Signalized Intersections along Alignment - *Number*	Field verification of the number of signalized intersections that a given alignment would cross within the alignment length.
				Major Intersections along Alignment - *Number*	Major Intersections were based on the average daily traffic (ADT) of the road that the red line was paralleling and the cross road. Both roads ADTs needed to exceed approximately 6,000 vehicles per day to be considered a major intersection.
				Average Daily Traffic along Alignment – *Vehicles per day*	ADT was calculated through traffic counts obtained from the Red Line Study. The State Highway's Traffic Trends Manual was also used in conjunction with the team's development of ADT's for various roadway alignments.
				Travel Lanes in Peak Direction - *Number*	The total travel lanes in the peak direction were counted (i.e. US 40 has three travel lanes in the peak direction due to parking lane restrictions being in place during peak hours).

Project Goals (from Purpose and Need)	**FTA Evaluation Categories**	**FTA Project Justification Rating Categories** (New Starts)	**Evaluation Criteria**	**Evaluation Measures – *Unit of Measurement***	**Evaluation Measure Definition**
				Existing Minimum Curb-to-Curb Width along Alignment – *Feet*	The edge of pavement line work from the GIS base mapping was measured using MicroStation.
				Existing Minimum Right-of-Way Width along Alignment – *Feet*	The right-of-way line on the GIS base mapping was measured using MicroStation.
				On-Street Parking – *Yes / No, length of parking eastbound (EB), length of parking westbound (WB)*	Field verification of the presence of on-street parking within the alignment for both the eastbound and westbound directions. On-street parking was considered regardless of restrictions and/or permit use.

B. ALIGNMENTS ELIMINATED DURING THE PRELIMINARY SCREENING

1. US 40 between I-695 and Ingleside Drive (BRT and LRT)

This alignment was evaluated as part of a longer alignment between a proposed I-70 western park-and-ride, along I-70 to I-695 to US 40 for both BRT and LRT. When compared to Security Boulevard or I-70, the alignment was eliminated from further study because of:

- A longer, more circuitous alignment would be required to reach a critical station location at the Social Security Administration; and
- Higher estimated construction costs.

2. Rolling Road between Rolling Bend Road and US 40 (BRT only)

This was another alignment to reach US 40 from Security Boulevard via Rolling Road for BRT only. This alignment was eliminated from further study because:

- A longer, more circuitous alignment resulting in longer travel times; and
- Would not serve the major employment center at the Social Security Administration.

3. Crosby Road between Rolling Road and Johnnycake Road (BRT and LRT)

This alignment provided an alternative to I-70 through the I-70/I-695 interchange for both BRT and LRT. It was eliminated from further study because:

- A longer alignment with longer travel time would be required, and
- Would not serve the Social Security Administration directly.

4. I-695 between Security Boulevard and US 40 (BRT and LRT)

This was proposed as an alignment from Security Boulevard to either I-70 or US 40 for both BRT and LRT. This alignment was eliminated from further study because:

- Higher construction costs associated with the existing interchanges at Security Boulevard, I-70, and US 40; and
- Other alignments would serve the Social Security Administration more directly.

5. Old Frederick Road Alignment (BRT and LRT)

This alignment, for either BRT or LRT, extended from Edmondson Avenue at either Swann Avenue or North Athol Avenue to Old Frederick Road to the existing Amtrak/MARC rail corridor to the West Baltimore MARC Station. It was eliminated from further study because:

- A longer, more circuitous alignment;
- Higher construction costs due to crossing and sharing the Amtrak/MARC rail corridor;
- The surrounding existing land use results in major barriers to walkability and access;
- Less potential for stations;
- Higher potential for noise impacts to receptors along the alignment; and
- Narrow existing roadway along Old Frederick Road.

6. Quarry Alignment (BRT and LRT)

This alignment, for either BRT or LRT, extends from Edmondson Avenue at North Hilton Street, south along Hilton Street and a bridge over an abandoned quarry and the Gwynns Falls, crossing and following along the existing Amtrak/MARC corridor to the West Baltimore MARC Station. The alignment was eliminated from further study because:

- More severe potential impact to Gwynns Falls Park;
- A longer, more circuitous alignment would be required;
- Higher construction costs due to a long bridge and sharing the Amtrak/MARC rail corridor;
- Major barriers to walkability and access;
- Less potential for stations due to the surrounding existing land use; and
- More length of forest crossings.

7. Baltimore Street-Fayette Street One-Way Pair between Amtrak/MARC and Martin Luther King, Jr. Boulevard (BRT and LRT)

From a relocated MARC station, this alignment, for either BRT or LRT, would extend in separate eastbound and westbound one-way transitways along Baltimore and Fayette Streets, respectively. The alignment was eliminated from further study because compared to US 40, Franklin Street, or Mulberry Street, this alignment had:

- Higher number of intersections;
- Higher capital costs due to the one-way transitway pair;
- More potentially impacted play lots and passive parks; and
- Impacts to on-street parking.

8. Lombard Street-Pratt Street One-Way Pair between Amtrak/MARC and Martin Luther King, Jr. Boulevard (BRT only)

From a relocated MARC station near Frederick Avenue, this alignment, for BRT only, would extend east along Frederick Avenue to the intersection of West Pratt Street. At this point, separate eastbound and westbound one-way transitways would extend along Pratt and Lombard Streets, respectively. The alignment was eliminated from further study because compared to US 40, Franklin Street, or Mulberry Street, this alignment had:

- A longer, more circuitous alignment;
- Higher number of intersections, including signalized intersections;
- Higher construction costs due to the Gwynns Falls crossing and one-way transitway pair;
- More individual historic properties within the Area of Potential Effect;
- More potentially impacted play lots and passive parks;
- Longer estimated transit travel time; and
- Impacts to on-street parking.

9. Lombard Street-Pratt Street One-Way Pair between Martin Luther King, Jr. Boulevard and Central Avenue (BRT and LRT)

This alignment was evaluated for both BRT and LRT. Similar to the alignment evaluated west of Martin Luther King, Jr. Boulevard, separate eastbound and westbound one-way transitways would extend along Pratt and Lombard Streets, respectively, to Central Avenue. This alignment was eliminated from further study because when compared to alignments located along Fayette, Baltimore, or Lombard Streets, this alignment was:

- Not as centrally located within the Central Business District;
- Longer estimated transit travel time;
- Fewer jobs nearby;
- More stream and floodplain crossings;
- Fewer buses on bus routes along the alignment; and
- Fewer existing bus routes intersected.

10. West Franklin and West Mulberry Streets East of Martin Luther King, Jr. Boulevard (BRT and LRT)

These alignments, for either BRT or LRT, were evaluated as alignments to reach Fayette, Baltimore or Lombard Streets via any of the north-south streets (e.g. Howard Street or St. Paul Street) east of Martin Luther King, Jr. Boulevard. These alignments were eliminated from further study because:

- Better operation scenarios are under consideration with the east-west movement through downtown and do not require turns; and
- Further from University of Maryland-Baltimore and its future development.

11. Saratoga Street Surface (BRT and LRT)

From the end of US 40 near Fremont Avenue, the alignment, for either BRT or LRT, would continue southeast to Saratoga Street at-grade and would follow Saratoga Street to the intersection with Saint Paul Street. The alignment would turn south and continue on Saint Paul Street to East Baltimore Street and East Fayette Street. This alignment was eliminated from further study because compared to alignments located along Fayette, Baltimore, or Lombard Streets, this alignment had:

- Fewer activity centers nearby, particularly the University of Maryland-Baltimore, one of downtown's largest employers;
- Fewer jobs nearby;
- Less approved development nearby;
- Less potential for stations; and
- Excessive grades for LRT.

12. Saratoga Street Tunnel (BRT and LRT)

This alignment, either for BRT or LRT, would begin east of North Arlington Avenue along the fully controlled access alignment of US 40 and would enter a tunnel under Saratoga Street either turning south under 1) Paca Street to Fayette Street, or 2) Saint Paul Street to Fayette Street, or 3) Saint Paul Street to Pratt Street. This option was eliminated from further study when compared to tunnel alignments under Fayette or Lombard Streets because of:

- Higher capital costs;
- Fewer activity centers nearby, particularly the University of Maryland-Baltimore, one of downtown's largest employers;
- Fewer jobs nearby;
- Less potential for stations.

13. Pratt Street Tunnel (BRT and LRT)

This alignment, either for BRT or LRT, would begin east of North Arlington Avenue along the fully controlled access alignment of US 40. The alignment would enter a tunnel under Fremont Avenue to the intersection of Pratt Street. The alignment would turn east under Pratt Street and continue under Pratt Street until portaling at the intersection of Pratt Street and Central Avenue. This alignment was eliminated from further study when compared to tunnel alignments under Fayette or Lombard Streets because of:

- Higher capital cost, and
- Fewer jobs nearby.

14. Lancaster Street (BRT and LRT)

This alignment, for either BRT or LRT, would provide direct access to Inner Harbor East. It was eliminated from further study because better operational scenarios are still under consideration with continuous east-west movement and minimal turns.

15. Summary

Based on the evaluation criteria established, **Table 2** is a summary of the technical reasons for eliminating the alignments evaluated during the preliminary screening. The check mark represents the technical reasons for the segments elimination.

Table 2: Summary of Key Technical Reasons for Elimination of Alignments in Preliminary Screening

Alignment	Technical Issue			
	Engineering & Cost **(e.g. , Design Criteria Met?; Constructability; Higher Capital Cost)**	**Greater Potential for Environmental Impacts** **(e.g., Parklands, Noise, Vibration, Historic Properties)**	**Mobility & Operational Factors** **(e.g., Travel Time, Traffic, Transit Connections)**	**Accessibility for Population & Jobs**
US 40 -- I-695 to Ingleside Dr.	✓		✓	✓
Rolling Rd. -- Rolling Bend Rd. to US 40			✓	✓
Crosby Rd. -- Rolling Rd. to Johnnycake Rd.			✓	✓
I-695 -- Security Blvd. to US 40	✓			✓
Old Frederick Rd. -- Edmondson Ave via Swann or Athol Ave to W. Baltimore MARC Station	✓	✓	✓	✓
Quarry Alignment – Edmondson Ave. via Hilton to W. Baltimore MARC Station	✓	✓	✓	✓
Baltimore/ Fayette One-Way Pair – MARC to MLK Blvd.	✓	✓	✓	
Lombard/Pratt One-Way Pair -- MARC to MLK Blvd.	✓	✓	✓	
Lombard/Pratt One-Way Pair -- MLK Blvd. to Central Ave.		✓	✓	✓
W. Franklin/W. Mulberry – east of MLK Blvd.			✓	✓
Saratoga St. (surface)	✓			✓
Saratoga St. (tunnel)	✓			✓
Pratt St. (tunnel)	✓			✓
Lancaster St.	✓		✓	

III. Other Alignments and Modes Eliminated

III. OTHER ALIGNMENTS AND MODES ELIMINATED

Following the preliminary screening of alternatives, further analysis was done on the alignments. This section describes the Red Line alignments that were eliminated further study based on additional analysis after the November 2005 workshops. These eliminated alignments are shown in blue on **Figure 2** except as noted.

What process have you used to eliminate alignments?

Before any alignment is eliminated, MTA performs a technical analysis, which varies in intensity depending on the alignment's location and the strengths and weaknesses of alternative alignments. If the analysis concludes an alignment should be eliminated from the study, MTA makes a recommendation to its Baltimore City and Baltimore County partners. If the City and County staff concur with the recommendation, it is then presented to the public at workshops. MTA considers public reaction before formally eliminating an alignment from further study. A document of all options considered will be provided in the DEIS and Technical Reports that accompany the DEIS.

A. OLDSTONE ROAD ALIGNMENT

The Oldstone Road Alignment was considered for a BRT or LRT alignment between the potential I-70 West park-and-ride, along Oldstone Road, Johnnycake Road, Fairbrook Road, and on new right-of-way to the western terminus of Security Boulevard. This alignment was identified primarily to serve the potential I-70 West park-and ride lot. The Oldstone Road Alignment was eliminated from further study for the following reasons:

- Commuters parking at an I-70 West park-and-ride would have longer travel times on Oldstone Road/Security Boulevard than if they had an option to stay on I-70 to a park-and-ride east of I-695; and
- This alignment is not consistent with the development that Baltimore County has approved on the parcel where new right-of-way for the transit alignment would be required.

B. I-70 WEST OF THE I-695 BELTWAY AND ASSOCIATED PARK-AND-RIDE COMMUTER STATION

Baltimore County requested eliminating the alignment along I-70 beginning west of the Beltway to east of the Beltway, and the associated commuter park-and-ride lot. This alignment of I-70 was recommended to be eliminated from further study for the following reasons:

- Longer travel time associated with boarding the transit line and stopping at two stations before reaching the I-70 East Station versus staying on I-70 and driving to the I-70 East Station;

- The need for a multi-level commuter parking garage because of insufficient space to provide surface parking at this location;
- The required permitting and mitigation to address environmental impacts to a stream, wetlands, and forested areas; and
- The I-70 West Station area is inconsistent with Baltimore County's land use goals.

C. DEDICATED BRT SURFACE ALIGNMENT ON SOUTH SIDE OF SECURITY BOULEVARD FROM CMS TO ROLLING ROAD

Security Boulevard from CMS to Rolling Road is under utilized by traffic. Therefore this section of roadway has the additional capacity or "extra room" to accommodate the Red Line in a shared curb lane without any detriment to the transit operations and vehicular traffic. The dedicated BRT alignment within this segment would:

- Require additional right-of-way from the school and adjacent residential and commercial businesses;
- Would utilize a non-standard contra-flow condition;
- Would create additional delay at the intersection of Rolling Road and Security Boulevard which is already at a level of service 'F';
- Would create non-standard conflict points for vehicles entering/exiting several commercial shopping areas; and
- Would require significant increased capital cost compared to the shared-use alignment.

For these reasons and that another feasible design alignment is still under consideration for BRT, this alignment was eliminated.

D. DEDICATED SURFACE ALIGNMENT FROM SOUTH SIDE OF MALL TO SOUTH SIDE OF SECURITY BOULEVARD

This alignment for BRT or LRT would be on the south side of the Mall traveling back north to an alignment on the south side of Security Boulevard. Because of the longer travel times that would be associated with this alignment swinging on the south side of the Mall than back up to Security Boulevard, this alignment for BRT and LRT was eliminated.

There are other BRT and LRT alignments still under consideration in this area including:

- Continuous dedicated facility along the south side of Security Boulevard, and
- North side of the mall connecting with a dedicated facility along the south side of Security Boulevard east of I-695.

E. TWO CENTRAL SOCIAL SECURITY ADMINISTRATION ALIGNMENTS

The General Services Administration (GSA) and staff from the Social Security Administration (SSA) expressed their opposition to the alignment between Woodlawn Drive and I-70 that bisects their existing parking lot due to in the future this area will be

within the secure perimeter surrounding the SSA campus. Also the GSA and SSA did not support the alignment that would begin at the proposed SSA West Station, run parallel to Dead Run, cross Woodland Drive at-grade then turn south and parallel Woodlawn Drive to the proposed SSA East Station, because of the potential impacts to SSA's Day Care Center. Also, the associated grades of this alignment and the potential environmental impacts to Dead Run lead to a recommendation to drop this alignment from further study.

The Central Alignment from the proposed SSA West Station to the proposed station on Woodlawn Drive and to the proposed SSA East Station continuing to I-70 were eliminated from further study. Therefore the Woodlawn Station and SSA East Station were also eliminated from further study.

F. STAMFORD ROAD ALIGNMENT

The Stamford Road Alignment was recommended as a one-way southbound, surface LRT alignment coupled with a one-way northbound, surface LRT alignment on Cooks Lane. Two-way transit on Cooks Lane has been retained for further study; refer to Chapter V. However, the Stamford Road Alignment was recommended to be eliminated from further consideration for the following reasons:

- The existing local, residential character of the neighborhood is not conducive to LRT;
- Various engineering constraints including, limited right-of-way and subsequent impacts, steep grades, horizontal curves, and reduced LRT operating speeds;
- On-street parking must be maintained since there are no driveways, making the available width prohibitive; and
- To remain within the narrow 50 feet of right-of-way and maintain parking, a shared travel lane with LRT and vehicular traffic would be required.

G. BROOKWOOD ROAD TUNNEL OPTIONS

Brookwood Road traverses the West Hills neighborhood north to south from Briarcliff Road to US 40/Edmondson Avenue and serves local traffic within the neighborhood. Brookwood Road intersects with Briarcliff Road at a T-intersection, forming a boundary to Gwynns Falls/Leakin Park. A tunnel under Brookwood Road was considered as a BRT or LRT alignment connecting from I-70 at Security Boulevard to US 40. Tunnel and surface alignments on Cooks Lane were also considered in this area to connect I-70 to US 40 and to avoid impacts to parkland. An analysis of alignments between Brookwood Road and Cooks Lane resulted in the elimination of the Brookwood Road alignment for the following reasons:

- In accordance with Section 4(f) of the U.S. Department of Transportation Act of 1966 (49 U.S.C. 393[c]), there are other feasible and prudent alignments for a

BRT/LRT transitway between I-70 and US 40 that would not impact parkland; and
- The cost differential of constructing a tunnel under Cooks Lane compared to Brookwood Road is not of an extraordinary magnitude to impact parkland with the construction of a Brookwood Road Tunnel.

H. US 40/FRANKLIN STREET ALIGNMENT ALONG FRANKLINTOWN ROAD AND CALVERTON ROAD

Previous studies at the West Baltimore MARC station have identified the problems with the location of the existing station platform, which is within a curve in the railroad alignment. This curve does not allow for the optimum passenger boarding from the platform onto the steps of the train. To address these issues one potential solution was to relocate the West Baltimore MARC station further south where the Amtrak rail alignment is straighter, and more land exists for a larger parking facility and possible transit oriented development.

To accommodate access between the Red Line alignment to a potentially relocated West Baltimore MARC Station, two alignments were included from US 40/W. Franklin Street, along N. Franklintown Road or N. Calverton Road and along the existing MARC/Amtrak alignment back to the US 40 corridor. Another reason to shift the alignment from W. Franklin Street to N. Calverton or N. Franklintown Roads was the possibility of Red Line alignments not being feasible along Franklin Street. However, with further study of the US 40/ W. Franklin Street corridor, the Study Team revealed that the existing 100 feet of right-of-way was adequate to provide dedicated BRT or LRT, two or three vehicular lanes along US 40/W. Franklin Street between N. Franklintown Road and Pulaski Street, and a BRT or LRT station at the existing West Baltimore MARC Station. Refer to Chapter V for a description of the alignments still under consideration for US 40/W. Franklin Street between Hilton Parkway and the West Baltimore MARC Station.

The US 40/W. Franklin Street Alignment along N. Franklintown Road and N. Calverton Road was eliminated from further consideration for the following reasons:

- There are three other viable alignments to provide a BRT or LRT transitway along the existing US 40/W. Franklin Street corridor;
- Public outreach efforts, transit oriented development studies and discussions with representatives of the City of Baltimore during the Red Line Study have indicated a preference to keep the West Baltimore MARC Station at its current location, provided it is feasible to integrate a BRT or LRT station at this location;
- The indirect and longer distance would require longer travel time and higher costs to construct;
- Higher costs would be incurred for an alignment within and parallel to the Amtrak/MARC alignment; and
- Potential negative effects to the Bentalou Elementary School which is located adjacent to this alignment.

I. US 40/EDMONDSON AVENUE OR FRANKLIN STREET TUNNEL ALIGNMENT FROM WALNUT AVENUE TO N. CALVERTON ROAD

Tunnel alignments under US 40/Edmondson Avenue and Franklin Street were considered for the alignment between Edmondson Village and the West Baltimore MARC station. The preliminary analysis of these tunnel alignments focused on the crossing of the Gwynns Falls Park.

1. Edmondson Avenue Tunnel – Bridge Alignment

A tunnel alignment was considered under US 40/Edmondson Avenue from Walnut Avenue just west of Wildwood Parkway to Linnard Street just west of Hilton Parkway, resulting in a tunnel approximately 2,400 feet not including the portal sections. From the portal at Linnard Street just west of Hilton Parkway, the Edmondson Avenue Tunnel - Bridge Alignment would continue east on a surface alignment in the center of Edmondson Avenue. The transitway would cross the Gwynns Falls Park on the existing bridge and continue to the east on the surface of US 40/Edmondson Avenue. The Edmondson Avenue Tunnel - Bridge Alignment was eliminated from further consideration for the following reasons:

- The short length of the tunnel would required a cut and cover construction method, which would temporarily impact access for residences in this area;
- A short tunnel is not practical because the costs of a tunnel would far exceed the travel time benefits of a faster transitway and still result in temporary impacts to the community; and
- A portal within Edmondson Avenue at Linnard Street would not fit within the existing roadway right-of-way. With the two-vehicular lane alignment, full-time parking would only be permitted on the south side of US 40. With the three, vehicular lane alignment additional right-of-way would be needed from the adjacent residential properties.

2. Edmondson Avenue Tunnel - Under the Park Alignment

The Edmondson Avenue Tunnel – Under the Park Alignment would generally begin just east of Athol Avenue, continue under Edmondson Avenue, and portal in the vicinity of the West Baltimore MARC station. This tunnel from Hilton Parkway would require a deep alignment in order to clear the building foundations and ensure the structural integrity of the existing roadway bridge over Gwynns Falls Park. Therefore, the Edmondson Avenue Tunnel – Under the Park Alignment was eliminated from further consideration because:

- A deeper tunnel would increase the length and the cost of the tunnel, thus increasing the depth and cost for any stations planned for this area.

3. North Franklin Street Tunnel - Bridge Alignment

The North Franklin Street Tunnel – Bridge Alignment tunnel alignment would begin with a portal near Athol Avenue, continue on a tunnel alignment and portal west of the

Gwynns Falls near Hilton Parkway. This alignment for the North Franklin Street tunnel would portal at Hilton Parkway where more right-of-way is available and impacts to residences would be reduced. This alignment would cross the Gwynns Falls Park on a new structure and re-enter a tunnel on the east side of the park to a portal near North Calverton Road. The North Franklin Street Tunnel – Bridge Alignment was not retained because:

- A feasible alignment exists, the North Franklin Street – Tunnel Alignment, which would not impact the Gwynns Falls Park or the stream.

J. EDMONDSON AVENUE ALIGNMENT FROM LONGWOOD STREET TO PULASKI STREET

Edmondson Avenue between Longwood Street and Pulaski Street was identified as being under-utilized by traffic and thus having additional capacity or "extra room" to accommodate the Red Line if it became difficult to continue the transitway along the US 40 corridor. After further analysis of the alignments on US 40/W. Franklin Street, this alignment of Edmondson Avenue was eliminated from further consideration for the following reasons:

- There are three other feasible alignments that provide a BRT or LRT transitway along the existing US 40/W. Franklin Street corridor that are more appealing than an alignment along Edmondson Avenue. (Refer to Chapter V for a description of these alignments on US 40/W. Franklin Street);
- The City of Baltimore and the public have expressed their desire to keep the West Baltimore MARC Station in its current location. Therefore the Red Line would need to transition south from Edmondson Avenue to the US 40 corridor and provide a LRT/BRT station very close to the MARC station. Providing a transition from Edmondson Avenue to the West Baltimore MARC Station and accommodating a transit station would be problematic and result in an undesirable location for the transit station or an unacceptable configuration.

K. SCHROEDER STREET TO FAYETTE STREET TUNNEL

This alignment was for BRT only and included both Schroeder and Fayette Streets. It was considered as an alternative location to surface alignments to tunnel portals along Martin Luther King Boulevard. The BRT alignment would operate in shared lanes on both Schroeder and Fayette Streets to a proposed portal location at Freemont Avenue. This alignment was eliminated from further study because:

- Schroeder Street is a local residential street;
- Operating in dedicated transit lanes on Schroeder Street would eliminate on-street parking;
- Shared transit on Schroeder Street would compromise both the Red Line and local bus operations because approximately 100 buses per hour would need to be accommodated;

- Fayette Street west of Martin Luther King Boulevard is also a residential street (although it is currently one-way and has higher speeds than most local streets.) The portal would also eliminate parking on both sides and have significant construction impacts in a residential neighborhood;
- There are other surface alignments along Martin Luther King Boulevard and a tunnel alignment under Freemont Avenue that are still under consideration. Refer to Chapter V.

Because this alignment was eliminated Schroeder Street, Fayette Street to Martin Luther King Boulevard, and this tunnel portal were subsequently dropped.

L. FREMONT AVENUE FROM MULBERRY STREET TO MARTIN LUTHER KING BOULEVARD (SURFACE)

A surface transit alignment along Fremont Avenue was considered for the Red Line to connect BRT or LRT from US 40/Franklin Street/Mulberry Street to Martin Luther King, Jr. (MLK) Boulevard. This alignment was identified as an alternative corridor to MLK Boulevard. Existing Fremont Avenue has several constraints which limit the design alignments for BRT/LRT along this street and was therefore eliminated because:

- The existing 40-foot curb-to-curb width within 66 feet of right-of-way would not accommodate parking, two travel lanes, and two dedicated transit lanes. Only shared transit/vehicular lanes would fit, without requiring both additional right-of-way and curbside parking;
- Curbside parking is the only available parking for many homes on Fremont Avenue, so it is not desirable to remove the parking from both sides of the street; and
- There is no feasible alignment connection between US 40 and Fremont Avenue.

M. PACA STREET/EUTAW STREET TRANSIT COUPLET

As an alternative alignment to surface transit along MLK Boulevard, a Paca Street/Eutaw Street transit couplet was considered. The northbound transitway would operate in the 2nd lane out on Paca Street with the southbound transitway on Eutaw Street. This would require Eutaw Street to be converted to one-way southbound for general purpose traffic.

The Paca Street/Eutaw Street Transit Couplet would also require a couplet along West Franklin Street/Mulberry Street in order to transition from the US 40/Franklin Street/Mulberry Street alignments to the Paca-Eutaw couplet. This connection would create traffic conflicts where the transitway turns to and from the east-west streets. The Paca Street/Eutaw Street Couplet was eliminated from consideration because:

- LRT alignments would need an exclusive signal phase at the intersections of Baltimore and Eutaw Streets, Mulberry and Eutaw Streets, and Paca and Franklin Streets to avoid impacts with traffic. This exclusive signal phase would

incur delay for traffic because only LRT would be permitted through the intersection during that phase and all general traffic would be stopped.
- Right turns at a red light would be prohibited to avoid conflicts for westbound traffic traveling on Lombard Street and for northbound traffic traveling on Paca Street at Mulberry Street.
- This alignment would require Eutaw Street to be converted to one-way southbound, causing impacts to existing traffic flow on three adjacent north-south streets (including Howard Street) in a redeveloping section of the Central Business District (CBD).

The advantages of a transitway on MLK Boulevard over a Paca Street/Eutaw Street Couplet are more efficient transit operations with fewer transit/traffic conflicts and fewer turns therefore operating faster.

N. BALTIMORE STREET/FAYETTE STREET TRANSIT COUPLET ALIGNMENT

A one-way, eastbound BRT or LRT transitway along Baltimore Street coupled with a one-way, westbound BRT or LRT alignment along Fayette Street was considered through downtown. In addition to surface alignments, tunnel alignments are under study through downtown. The other surface alignments that were retained for further study include a transit couplet along Baltimore and Lombard Streets, as well as a two-way alignment on Baltimore Street.

The analysis of surface alignments through the CBD focused on the distances to existing Metro and LRT stations, proximity to the major downtown activity centers, parking, traffic flow, and the nature of land use along the street corridors. The Baltimore Street/Fayette Street Couplet was not recommended for further consideration because other alignments exist that would better support a transitway:

- The Baltimore Street two-way alignment and the Baltimore Street/Lombard Street Couplet would locate the transitway closer to the highest concentration of activity zones in downtown; and
- The wider curb-to-curb distance on Lombard Street and deeper building setbacks are more conducive to supporting a BRT or LRT alignment than on Fayette Street.

O. SHORTER DOWNTOWN TUNNEL

A shorter tunnel from approximately Hopkins Place to Central Avenue under Lombard Street was considered. Such a tunnel was determined to be the shortest feasible tunnel through downtown and would be able to avoid crossing the existing CSX tunnel under Howard Street. To avoid the CSX tunnel, the first opportunity for a portal was determined to be near Hopkins Place near the 1st Mariner Arena. West of this portal, a variety of surface alignments on Baltimore and Fayette Streets were evaluated. While a shorter tunnel avoided conflict with the major north-south streets between Howard Street and Central Avenue, it would not avoid the major north-south streets between

Howard Street and MLK Boulevard, inclusive. Therefore, a shorter downtown tunnel from Hopkins Place to Central Avenue was eliminated from further consideration because:

- Major north-south streets including MLK Boulevard, Greene Street, Paca Street, Eutaw Street, and Howard Street would not be avoided; therefore, conflicts and delay would be incurred at each of these intersections.

P. PIER 5/PIER 6 TO FLEET/ALICEANNA TRANSIT COUPLET TO CENTRAL AVENUE

A dedicated north-south transit alignment along Falls Way (Pier 6) and Harbor Magic Way (Pier 5) to a shared alignment along Eastern Avenue (west of President Street), to a dedicated north-south surface transit alignment in the median of President Street to a second lane out configuration along Fleet and Aliceanna was evaluated. This alignment connecting to an Eastern Avenue/Fleet Street transit couplet has been retained for further study. (Refer to Chapter V.)

The Piers 5/6 to Fleet/Aliceanna connection was eliminated from further consideration because:

- On President Street, using the median for transit would remove the area currently used for left turn lanes. Since there is no room to widen President Street, left turn lanes would either displace one or more of the three travel lanes or would share one or more lanes with through traffic. Either solution would exacerbate an already highly congested areas; and
- The connection to Fleet/Aliceanna continues down the median of President Street around the roundabout at the Katyn Memorial. The alignment at the roundabout will likely impact the lawn surrounding the Katyn Memorial which is a resource protected by Section 4(f) of the US Department of Transportation Act of 1966 (49 USC 393[c]). The roadway around the memorial has an inside turning radius of approximately 60 feet, which is the minimum turning radius allowed for the study's design criteria. Any impacts to the Katyn Memorial are not feasible if other viable alternatives exist.

There are three viable alternative alignments still under consideration in this area: (1) a connection between the Pier 5/Pier 6 alignment to the Eastern/Fleet alignment and (2) a connection between the Central Avenue alignments and the Eastern/Fleet alignment and (3) a connection between the Central Avenue alignments and the Fleet/Aliceanna alignments. (Refer to Chapter V.)

Q. PRESIDENT STREET ALIGNMENT

A dedicated north-south surface transit alignment in the median of President Street was considered to connect the east-west transit alignments in downtown to the east Baltimore neighborhoods along Eastern Avenue, Fleet Street, or Aliceanna Street. Taking the median space for transit would remove the area currently used for left turn

lanes. Since there is no room to widen President Street, left turn lanes would either displace one or more of the three travel lanes or would share one or more lane with through traffic.

The President Street Alignment was eliminated from further consideration because:

- There are other feasible alignments that would provide a north-south connection to east-west transit alignments that could support the addition of a transit alignment without adding to an already congested condition.

The three alignments still under consideration that would provide a north-south connection to east-west alignments in a less disruptive way are: Pier 5/Pier6 Transit Couplet; Central Avenue from Fayette Street to Aliceanna Street; and tunnel alignments which extend from the CBD to surface alignments east of President Street. Refer to Chapter V for more information on these alignments.

R. EASTERN AVENUE TWO-WAY TRANSIT ALIGNMENT

The Red Line Study Team established priorities to be considered in the analysis of surface alignment alignments on Eastern Avenue through Fells Point. The first priority was to provide dedicated transit on Eastern Avenue. The second priority was to maintain at least one lane of parking, but parking on both sides of the street was preferred.

Given these priorities analyzing the possible configurations within the existing 41-foot curb-to-curb width, two-way transit on Eastern Avenue was not retained for further consideration for the following reasons:

- With only four existing vehicular lanes to utilize, it was not feasible to maintain two dedicated transit lanes, two vehicular travel lanes, and on-street parking on at least one side of the street;
- To widen the roadway to accommodate the extra lane, sidewalks would have to be reduced to an unacceptable width for a street with a substantial number of storefront businesses; and
- There are two other feasible surface alignments through the Fells Point neighborhood that are still under consideration: the Eastern Avenue/Fleet Street Couplet or the Fleet Street/Aliceanna Couplet. (Refer to Chapter V for a description of these alignments.)

S. CANTON LOOP ALIGNMENT

A one-way loop around the Canton and Highlandtown neighborhoods was considered. This alignment could include either of two transit alignments:

1) Eastern Avenue/Conkling Street/Boston Street/Fleet Street
2) Fleet Street/Conkling Street/Boston Street/Aliceanna Street

The direction of flow could be either clockwise or counterclockwise.

One advantage to providing a loop alignment was the greater geographic coverage in the Canton neighborhood. However, this comes at the expense of service quality. The travel time, convenience for riders, and reliability of the service would be compromised with the loop alignment because of the trip time required for one direction of travel. Depending on where their station was in the loop, passengers would have longer travel times than on a linear alignment. Many passengers, on one of their two trips per day, would have to travel in the reverse direction from their desired path for a portion of their trip. Also, at the end of any transit line there is a layover point for schedule recovery that allows for each trip to begin on schedule. Because of the directional loop, a passenger on the vehicle or at a station could be delayed several minutes due to this layover. The average layover time could be between five and 15 minutes. Therefore, the Canton Loop Alignment was eliminated from further consideration for the following reasons:

- This alignment would have longer travel times and delays, and would be an inconvenience for some passengers; and
- There are two other feasible surface alignments through the Canton neighborhood: the Eastern Avenue/Fleet Street Couplet or Boston Street. (Refer to Chapter V for a description of these alignments.)

T. CONKLING STREET (LRT)

As a means of achieving additional geographic coverage, the Eastern-Fleet transit couplet was proposed to extend south on Conkling Street to Boston Street at Canton Crossing. Likewise, for Boston Street alignments, the transitway would extend north on Conkling Street to Eastern Avenue.

The *Baltimore Regional Rail System Plan* recommended future extension of the Red Line east of this study's limit to eastern Baltimore County. An end alignment that is oriented north-south would be inconsistent with the recommended extension to the east. Conkling Street was eliminated from further study because:

- The original Red Line study area limits have been extended to Bayview. Alignments would extend eastward from Eastern and Fleet Streets or Boston Street, and therefore, an alignment on Conkling Street is no longer necessary.

U. WHY NOT HEAVY RAIL?

Heavy Rail Transit is the technology for the existing Baltimore Metro line between Owings Mills and Johns Hopkins Medical Complex. Metro has the capacity for a high level of transit ridership and is characterized by high speed and a total separation from all other vehicular and pedestrian traffic. For the Red Line corridor, a Metro line would require significant tunneling and aerial structure for total separation from its environment, since at-grade rights-of-way do not generally exist. Two applications for surface in the Red Line Corridor are within I-70 right-of-way inside the Beltway and at

the lower level of US 40 in West Baltimore. If Metro were to be developed in the Red Line corridor, an example of how it could potentially be constructed is described below.

Conceptual Heavy Rail Project in the Red Line Corridor

The project would begin at Security Boulevard near the Center for Medicare and Medicaid Services (CMS). The line would be in aerial structure along Security Boulevard to Woodlawn Drive and continue in aerial structure along Woodlawn Drive to I-70. The line would then operate at-grade within the existing right-of-way of I-70 to the end of I-70 at Cooks Lane. The line would then proceed in tunnel under Cooks Lane, Edmondson Avenue, and Franklin Street to Pulaski Street (near the West Baltimore MARC Station) where it would proceed to the lower level of US 40. The line would operate in surface in the median of the lower level of US 40 and go into tunnel at the east end of this depressed roadway then proceed in tunnel under Fremont Avenue, and continue in tunnel under Lombard Street, President Street, and Eastern Avenue, ending at Eastern Avenue and Conkling Street. The total length of this conceptual heavy rail line would be 11.7 miles with 7.5 miles in tunnel, 2.0 miles aerial, and 2.2 miles surface.

Sixteen (16) stations would potentially be located as follows:

- CMS
- Security Square Mall
- Social Security Administration
- I-70 Eastern Terminus
- Westside Skill Center/Edmondson Village Shopping Center
- Allendale Street
- Rosemont
- West Baltimore MARC Station
- Poppleton
- University of Maryland Complex
- Hopkins Place/Light Rail and Metro
- Inner Harbor/Aquarium
- Central Avenue
- Fells Point
- Patterson Park
- Conkling Street/Highlandtown

The order-of-magnitude capital cost for this alternative is $2.2-$2.4 billion including construction of the alignment, stations, vehicles, yard and shop, and system engineering costs.

A variation of the conceptual project described above would be to leave the Eastern Avenue alignment east of Fells Point and proceed east in tunnel under Boston Street to Conkling Street, and then change from tunnel to aerial alignment to I-895/I-95. The total length of this alternative would be 12.7 miles, with 7.7 miles in tunnel, 2.8 miles aerial, and 2.2 miles surface. The stations would be the same as in the previous alternative other than the addition of stations in Canton, Canton Crossing and at I-895/I-95 and the

deletion of stations at Patterson Park and Highlandtown. The order-of-magnitude capital cost for this alternative is $2.4-$2.6 billion.

Why Heavy Rail Is Not an Alternative under Study in the Red Line Corridor

There are a series of questions and answers that can best explain why Metro is not being studied in the Red Line Corridor Transit Study:

Does the federal government require heavy rail transit to be studied in a major corridor transit study?

No. The Federal Transit Administration (FTA) is the federal agency responsible for the management of rail corridor studies and ultimately for providing grants for rail construction. This management is through FTA's New Starts Program. FTA technical guidance requires consideration of a reasonable range of alternatives with particular emphasis on lower cost, more affordable options such as light rail, bus rapid transit and transportation systems management improvements. There is no stipulation that heavy rail transit, or any specific mode, must or should be studied. In fact, of the 34 projects currently in the FTA New Starts Program across the United States, 27 projects are not considering heavy rail transit as an option.

Would a Red Line Metro project be funded for construction by the Federal Transit Administration?

The FTA evaluates any proposed rail project by a set of criteria that measure a transit project's:

- Cost effectiveness
- Affordability
- Potential for ridership
- Travel time savings for transit riders
- Potential benefits for local land use and development
- Environmental benefits, and
- Ability to meet project purpose and need.

It is important to note that the competition for funds across the nation is fierce as the number of projects far exceeds the FTA's ability to fund the projects.

For a project capital cost in the range of $2.2-$2.6 billion, a project would typically need to have a projected daily ridership of between 130,000-150,000 trips per day to be competitive nationally, based on the FTA criteria outlined above. Although ridership forecasts have not been developed for a Metro option or for any of the alternatives in the study at this time, it is unlikely that forecasts would result in this range of ridership. For a sense of comparison, the existing Metro line between Owings Mills and Johns Hopkins Medical complex carries about 45,000 trips per day.

Therefore, based on cost effectiveness, it would appear that a Red Line project at a $2.2-$2.6 billion cost level would be a very difficult project for FTA to approve. However, even if FTA were to approve the project, the New Starts Program budget is limited. To enable funding for as many projects as possible, FTA attempts to spread its program funds.

Although the New Starts Program allows for 80% of construction costs to be funded with federal funds, FTA for many years has only been funding at a 50% level. For a Red Line project this would equate to $1.2-$1.3 billion. Experience over the last several years, however, has shown that FTA caps its contribution to a maximum of $500 million for projects, again, to fund as many projects as possible. So even if the FTA were to fund a Red Line Metro project at $500 million, another $1.7-$2.1 billion would need to come from state, local, or private sources.

Can the State of Maryland afford $1.7-$2.1 billion in state transportation funds for a Red Line Metro project?

No, it cannot. There are many transportation needs statewide, both transit and highway, that already exceed projected transportation revenues over the next 20 years. It is important that available funds for transit help improve and maintain the core bus system in Baltimore, provide for the operation and maintenance of existing Metro, Light Rail, and MARC lines, as well as help meet transit needs in other parts of the state. Although funds may be directed to new initiatives, $1.7-$2.1 billion in state dollars for one project is simply not financially feasible.

Would Baltimore be settling for second best rail transit? Aren't other cities studying and building heavy rail?

As mentioned earlier, there are 34 projects currently in the FTA New Starts Program in either planning or engineering. Of those, only seven are studying heavy rail. Twenty-seven are not. Of the seven projects that are studying heavy rail, five are extensions or branches of existing heavy rail lines in New York City, Northern Virginia (Dulles Extension), Miami, Los Angeles, and Santa Clara (extension of San Francisco BART). Of the other two projects that are not direct extensions, one is in New York City and one is in Salt Lake City, Utah. The 27 projects that are not studying heavy rail include cities that have heavy rail such as Boston, Philadelphia, and San Francisco, as well as many cities that do not have heavy rail.

V. CAN THE RED LINE SHARE THE EXISTING METRO TUNNEL DOWNTOWN, THEREBY ELIMINATING THE NEED TO BUILD A NEW TUNNEL DOWNTOWN?

A thorough investigation was performed to see if the Red Line could share the existing Metro tunnel downtown. The existing Metro tunnel runs in a north-south direction under Eutaw Street, then east-west under Baltimore Street turning in a northeast direction again toward Johns Hopkins Hospital. The east-west portion under Baltimore Street

that could be shared with the Red Line is about 4,000 feet long. Another 6,000 feet of tunnel would be needed to reach the Red Line portals to the east and west of downtown (4,000 feet to the west of the Metro tunnel and 2,000 feet to the east of the Metro tunnel). The connections to break into the existing tunnel at either end require detailed, precise work that is more costly compared to the machine boring that would otherwise be used for a new Red Line tunnel. In addition, because light rail vehicles are narrower than the heavy-rail Metro vehicles, and the Metro vehicles are much too large to run on city streets, the Red Line cars would need to be configured differently. This would require substantial modifications within the existing Metro tunnel:

- Platforms would need to be modified to account for the difference in floor height and vehicle width;
- Power systems would need to be reconfigured since there is not enough headroom at the Metro Stations to accommodate a catenary system for the Red Line;
- Current Metro vehicles would need to be modified for the reconfigured power systems; and
- Train control and communications would need to be substantially reworked to accommodate the Metro and Red Line.

The cost of all of these modifications is estimated to add up to over $100 million. Additionally, it would cost another $100 million for the detailed, precise work needed to break into the existing Metro tunnel. All that substantially reduces expected savings from a shared downtown tunnel.

Operations along both the Metro and Red Line also would be affected. Constructing the connections into the existing tunnel would take several years. During this time, the Metro system would operate about 30 percent less frequently so construction can take place in a safe manner. That would lead to crowded trains during the morning and evening rush. It would also require a few periods when the Metro is completely shut down for several weeks while tracks and power systems are modified. After construction, both systems would need to operate on the same time frequencies so the vehicles can be safely staggered through the shared tunnel. This creates an inflexible system where neither the Metro nor Red Line can be adjusted to meet passenger demand. Furthermore, any delays on one line would have a ripple effect along the other line.

Although a shared downtown tunnel initially appears to save money during Red Line construction, the savings are not nearly as significant after factoring in the cost of converting the existing tunnel to handle both the Metro and Red Line. What savings remain do not justify the operational problems caused by joint use.

W. SUMMARY

Table 3 is a summary of the key technical reasons for eliminating other alignments and modes.

Table 3: Summary of Key Technical Reasons for Elimination of Other Alignments and Modes

Alignment	Longer Travel Time	Incompatible Land Use	Cost	Environmental Impacts	Engineering Constraints	Operational Constraints	Distance from Activity Zones	Inconsistent with Long Range Plan
Oldstone Rd.	✓	✓						✓
I-70 – west of I-695	✓		✓	✓				✓
BRT dedicated south side of Security Blvd.		✓	✓	✓	✓	✓		
Southside of Mall to south side of Security Blvd	✓							
Central Social Security Administration Alignments		✓		✓	✓			
Stamford Rd.		✓			✓	✓		
Brookwood Rd. Tunnel		✓		✓				
Franklintown Rd. or Calverton Rd.	✓	✓	✓	✓		✓		
Edmondson Ave. or Franklin St. Tunnel Options								
Tunnel-Bridge			✓		✓	✓		
Tunnel-Under the Park			✓					
N. Franklin St. Tunnel-Bridge				✓	✓			
Edmondson Ave. – Longwood St. to Pulaski St.					✓	✓		
Schroeder Street & Fayette St. to MLK		✓			✓	✓		
Fremont Ave. (surface)					✓	✓		
Paca St./Eutaw St. Transit Couplet					✓	✓		
Baltimore St./Fayette St. Transit Couplet					✓		✓	
Shorter Downtown Tunnel	✓					✓		
Pier 5/Pier 6 to Fleet/Aliceanna				✓	✓	✓		
President St. (surface)					✓	✓		
Eastern Ave. w/ 2-Way Transit					✓	✓		
Canton Loop	✓					✓		
Conkling St.								✓
Heavy Rail			✓					
Existing Metro Tunnel			✓		✓			

✓= technical reason for the segments elimination

RED LINE
Corridor Transit Study

IV. Bayview Alignments Eliminated

IV. BAYVIEW ALIGNMENTS ELIMINATED

A. INTRODUCTION

A feasibility study was conducted to consider alignments that would extend from the proposed Red Line alignments to the Johns Hopkins Bayview Medical Campus (Bayview) area. Continuing from the Red Line, the development of the alignments began from either the Eastern-Fleet couplet or the Boston Street alignment. Other goals established for developing the alignments were, if possible:

- Serve the Bayview Campus, with 5,000 existing jobs, plans for 5,000 more jobs, and hundreds of daily visitors;
- Provide an intermodal connection to the proposed Bayview MARC Station;
- Provide a park-and-ride lot for Red Line commuters with easy access from I-95 or I-895;
- Increase ridership on a Red Line Transit project by providing increased access; and
- Support and integrate with existing and potential development.

The study focused on the physical and operational feasibility of alignments, not developing refined engineering solutions. Twenty alignments were analyzed in the feasibility study for either BRT or LRT; two alignments were identified as feasible for further analysis in the DEIS. The analysis of the alignments included a feasibility assessment of the issues, opportunities and impacts of each alignment with regards to the following criteria:

- Access to Bayview,
- Connection to the proposed Bayview MARC Station,
- Property Impacts,
- Economic Development Opportunities,
- Compatibility with Rail Freight Operations,
- Impacts to Residences and Parking,
- Impacts to Business Operations,
- Traffic Impacts,
- Environmental/Contamination Concerns,
- Constructability,
- Travel Times, and
- Capital Costs.

B. ALIGNMENTS ELIMINATED

The following section briefly describes the alignments and summarizes the analysis of why 18 alignments were eliminated from further study and subsequently not incorporated into the Red Line Corridor Transit Study. For the complete analysis of the feasibility study alignments refer to the *Red Line Extension to Bayview Feasibility Study.* The alignments are presented and described in four groupings:

1. Boston Street – Eastern Avenue
2. Boston Street – East Baltimore MARC Station

3. Eastern/Fleet – Eastern Avenue
4. Eastern/Fleet – East Baltimore MARC Station

The alignments considered are shown on **Figure 3**.

1. Alignments Considered from Boston Street to Eastern Avenue

a. Pemco Alignment

The Pemco alignment was considered for BRT or LRT from Boston and Conkling Streets along abandon railroad right-of-way on the surface, then transitions into a tunnel under the active rail lines of Canton, Norfolk-Southern, and CSXT. The alignment would be on the surface crossing Oldham Street, following the north side of the Canton Railroad right-of-way to the Pemco industrial site traversing the property to Eastern Avenue at a point approximately opposite Bayview Boulevard. The Pemco Alignment was eliminated from further study for the following reasons:

- This alignment does not provide direct access to the Bayview. Access to the heart of the Bayview Campus would require a walk of slightly more than a quarter of a mile or the implementation of a shuttle service;
- This alignment does not provide direct access to the proposed Bayview MARC Station. A shuttle service would be required to access the station;
- This alignment would impact homes, businesses, and the United Auto Workers hall;
- This alignment may require the reconstruction of the Ponca Street and I-895 overhead bridges that currently cross the Canton Railroad right-of-way. The presence of pile-supported piers at the O'Donnell Street Viaduct and the need for a second short tunnel under the CSXT right-of-way would present some construction challenges; and
- Baltimore City has identified the Pemco site as an important industrial redevelopment property particularly because of its freight rail connection to the Canton Railroad line and proximity to Interstates 95 and 895. The need to take this prime industrial property without achieving significant advantages over the other alignments is enough to warrant a recommendation for early elimination.

b. Oldham Alignment

The Oldham alignment was considered for BRT or LRT from Boston and Conkling Streets along abandon railroad right-of-way on the surface, then transitions into a tunnel under the active rail lines of Canton, Norfolk-Southern, and CSXT. The alignment would be on the surface along Oldham Street to Eastern Avenue where it would turn eastward and be located in Eastern Avenue as it passes Bayview Boulevard. This alignment was eliminated from further study for the following reasons:

- This alignment does not provide direct access to the Bayview. Access to the heart of the Bayview Campus would require a walk of slightly more than a quarter of a mile or the implementation of a shuttle service;
- This alignment does not provide direct access to the proposed East Baltimore MARC Station. A shuttle service will be required to access the station;

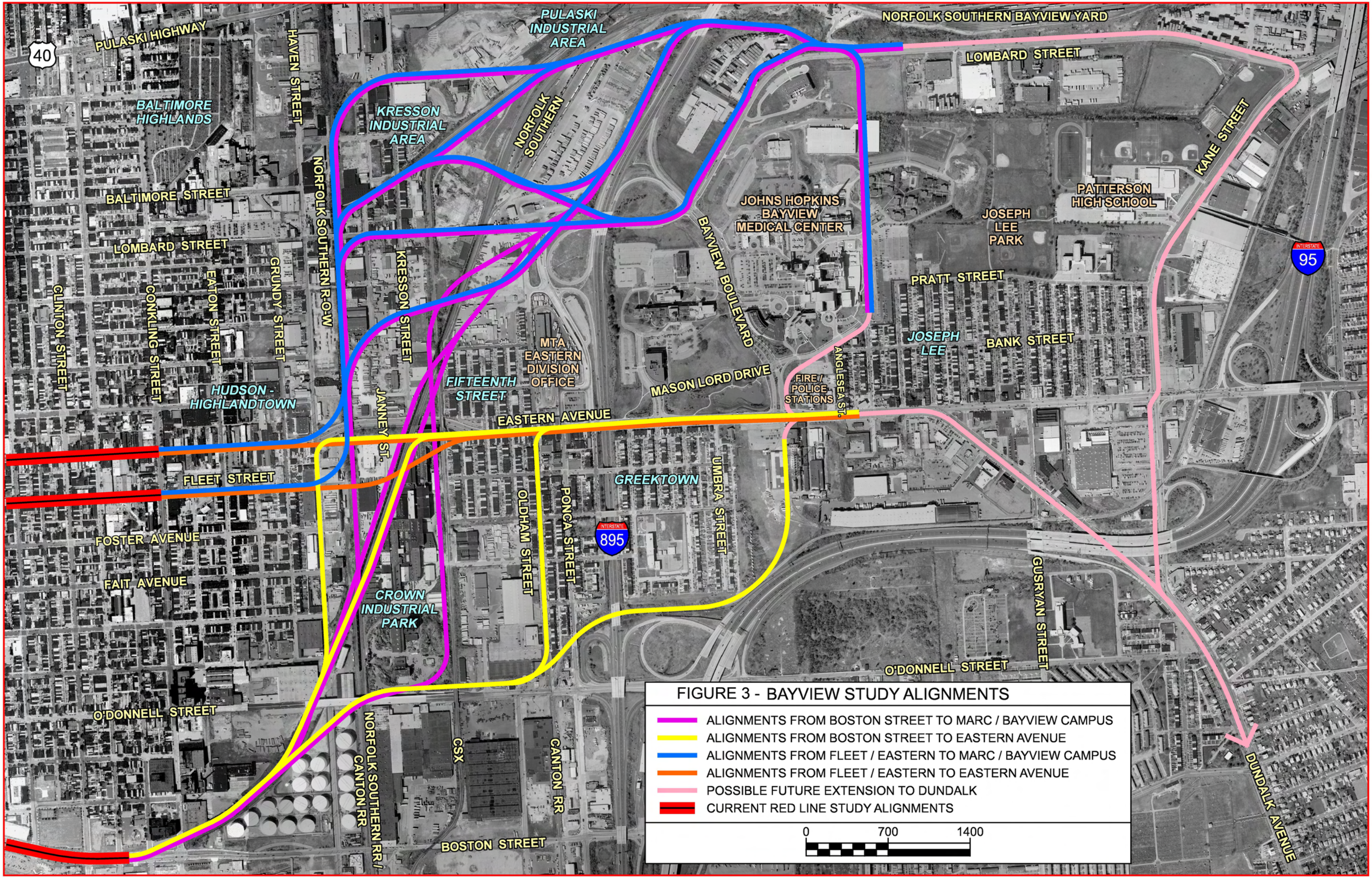


FIGURE 3 - BAYVIEW STUDY ALIGNMENTS

- ALIGNMENTS FROM BOSTON STREET TO MARC / BAYVIEW CAMPUS
- ALIGNMENTS FROM BOSTON STREET TO EASTERN AVENUE
- ALIGNMENTS FROM FLEET / EASTERN TO MARC / BAYVIEW CAMPUS
- ALIGNMENTS FROM FLEET / EASTERN TO EASTERN AVENUE
- POSSIBLE FUTURE EXTENSION TO DUNDALK
- CURRENT RED LINE STUDY ALIGNMENTS

0 700 1400

- Oldham Street is part of the Greektown residential neighborhood; an alignment on this street would impact homes and would have permanent and temporary impacts to travel and parking on this street; and
- This alignment would impact businesses and the United Auto Workers hall.

c. Greektown Alignment

The Greektown alignment was considered for BRT or LRT from Boston and Conkling Streets along abandon railroad right-of-way on the surface, then transitioning to an aerial structure over the O'donnell Street Viaduct and Canton and Norfolk-Southern rights-of-way to the west side of Crown Industrial Park. At the north end of the Crown Industrial Park the line would turn eastward on the original alignment of Eastern Avenue and continue east, crossing under the CSXT right-of-way at an existing bridge and meeting Eastern Avenue at its intersection with Macon Street. From Macon Street and Eastern Avenue the transitway would be located on the surface in Eastern Avenue as it passes Bayview Boulevard. This alignment was eliminated from further study for the following reasons:

- This alignment would not provide direct access to the Bayview. Access to the heart of the Bayview Campus would require a walk of slightly more than a quarter of a mile or the implementation of a shuttle service;
- This alignment would not provide direct access to the proposed Bayview MARC Station. A shuttle service will be required to access the station;
- This alignment would require the acquisition of right-of-way and buildings from the Crown Industrial Park and the Pemco site; and
- This alignment would have impacts to the residents, business, parking, and traffic operations along Eastern Avenue.

d. Haven Alignment

The Haven alignment was considered for BRT and LRT from Boston and Conkling Streets following the abandoned railroad right-of-way on the surface, under the O'Donnell Street Viaduct, and onto Haven Street. At Haven Street it would turn north and remain in the street until it reaches a point south of Eastern Avenue, turning east before descending into a tunnel under the Northfolk-Southern, Canton, and CSXT railroads and I-895. The transitway would remain in the tunnel until it returned to the surface in Eastern Avenue near Bayview Boulevard. This alignment was eliminated from further study for the following reasons:

- This alignment would not provide direct access to the Bayview. Access to the heart of the Bayview Campus would require a walk of slightly more than a quarter of a mile or the implementation of a shuttle service;
- This alignment would not provide direct access to the proposed East Baltimore MARC Station. A shuttle service will be required to access the station; and
- This alignment will require the construction of a railroad bridge to carry the inactive NS tracks and right-of-way over the transitway. To provide adequate vertical clearance under the inactive NS right-of-way, as well as adequate

vertical clearance for a tunnel under the I-895 corridor, the approaches to both ends of the tunnel would require grades of 8.0%.

2. Alignments Considered from Boston Street – Bayview MARC Station

a. Crown East Alignment

The Crown East Alignment was considered for BRT or LRT from Boston and Conkling Streets following the abandon railroad right-of-way for approximately 300 feet before ascending on an aerial structure over Canton and Norfolk-Southern railroads and O'Donnell Street Viaduct. The transitway comes to the surface at the south end of the existing Crown Industrial Park. From there the transitway would remain on the surface following the west side of the CSXT right-of-way to Eastern Avenue where it would ascend on an aerial structure over the Norfolk Southern right-of-way twice, the CSXT right-of-way, a trucking company property, the north end of Oldham Street, and Lombard Street. The aerial ends on the slope on the west side of the I-895 right-of-way. At this point, the transitway would cross under I-895 to a potential park-and-ride lot near the proposed Bayview MARC Station. From the proposed Bayview MARC station, the transitway continues at-grade, crossing Lombard Street to the Bayview Medical Center and a proposed extension of Mason Lord Drive. This alignment was eliminated from further study for the following reasons:

- Right-of-way would have to be acquired from the Crown Industrial Park and other industries adjacent to the railroad rights-of-way;
- This alignment would require a high capital cost investment; and
- The northern most aerial structure would cross through a proposed development at Greektown North.

b. Crown West Alignment

The Crown West alignment was considered for BRT and LRT from Boston and Conkling Streets. It would follow the abandoned railroad right-of-way on the surface for approximately 400 feet before descending into a tunnel that would cross under all railroads, streets and properties before returning to the surface at the trucking company properties on the west side of Oldham Street south of Lombard Street. The tunnel would be one mile in length. On the surface, the transitway would cross the intersection of Ponca and Lombard Streets at-grade and continue on retained fill along the west side of the I-895 right-of-way to the south end of the I-895 viaduct, under I-895 to a potential park-and-ride lot near the proposed Bayview MARC Station. From the proposed Bayview MARC station, the transitway continues at-grade, crossing Lombard Street to the Bayview Medical Center and a proposed extension of Mason Lord Drive. This alignment was eliminated from further study for the following reasons:

- This alignment would require the greatest capital cost investment, and
- There are other feasible alignments that would provide a connection between Boston or Eastern and Fleet Street to Bayview with a direct connection at the proposed Bayview MARC Station.

c. Canton Railroad Alignment

The Canton Railroad Alignment was considered for BRT or LRT and is similar to the Crown West Alignment but with a shorter tunnel. The tunnel would extend from the east side of Haven Street and ascend to the surface in the existing trucking company properties west of Oldham Street and south of Lombard Street. The alignment would be at-grade on the west side of I-895 to the south end of the I-895 viaduct, crossing under the interstate to the Bayview MARC Station, and continue at-grade across Lombard Street to the Bayview Medical Campus at the proposed extension of Mason Lord Drive. This alignment was eliminated from further study for the following reasons:

- Right-of-way would be required from the trucking company properties west of the Norfolk Southern right-of-way, south of Eastern Avenue, west of Oldham Street and south of Lombard Street;
- This alignment would require an operating agreement with the Canton Railroad; and
- There are other feasible alignments with a lower capital cost investment that would provide a connection between Boston or Eastern and Fleet Street to Bayview with a direct connection at the proposed Bayview MARC Station.

d. Central Alignment from Boston Street

The Central alignment was considered for BRT or LRT from Boston and Conkling Streets. The transitway would stay on the surface and follow the abandoned railroad right-of-way, cross under the O'Donnell Street Viaduct, and cross Haven Street at grade following the abandoned railroad right-of-way. Continuing past Haven Street it would cross the Canton Railroad's track at grade, then would turn northward and follow the east side of the inactive Norfolk Southern right-of-way to a point near Bank Street where it would turn eastward passing through several small business and industrial properties on either side of Kresson Street and ascend to an aerial structure. The aerial structure would carry the transitway over the CSXT and active Norfolk Southern rights-of-way, one of the trucking company properties west of Oldham Street, as well as Oldham, Ponca and Lombard Streets. The transitway would descend to the surface on the west side of I-895 after crossing above Lombard Street. The alignment would be at-grade on the west side of I-895 to the south end of the I-895 viaduct, crossing under the interstate to the Bayview MARC Station, and continue at-grade across Lombard Street to the Bayview Medical Campus at the proposed extension of Mason Lord Drive. This alignment was eliminated from further study for the following reasons:

- This alignment would have greater impacts to active commercial businesses than other feasible alignments under consideration. Acquisition of all or part of several businesses adjacent to the inactive Norfolk Southern right-of-way would be required for the aerial structure and associated piers within these properties;
- This alignment would require an operating agreement with Norfolk Southern and the Canton Railroads;
- This alignment would cross through the proposed development at North Greektown on an aerial structure; and

- There are other feasible alignments with similar capital cost investments and without greater property impacts.

e. Lombard Alignment from Boston Street

The Lombard alignment was considered for BRT or LRT from Boston and Conkling Streets. The transitway would stay on the surface and follow the abandoned railroad right-of-way, cross under the O'Donnell Street Viaduct, and cross Haven Street at grade following the abandoned railroad right-of-way. Continuing past Haven Street it would cross the Canton Railroad's track at-grade, then would turn northward and follow the east side of the inactive Norfolk Southern right-of-way to Lombard and Janney Streets. The alignment would turn east and would be in shared lanes on Lombard Street to Ponca Street, the alignment would then shift to northside of Lombard Street under I-895 to the proposed Bayview MARC station and continue at-grade across Lombard Street to the Bayview Medical Campus at the proposed extension of Mason Lord Drive. This alignment was eliminated from further study for the following reasons:

- This alignment would require acquisition of businesses and residential properties between the Norfolk Southern right-of-way and Janney Street, and more properties would need to be acquired if there was insufficient clearance at the existing CSXT bridge,
- There would be impacts to residences and parking along Lombard Street;
- This alignment would have adverse impacts to traffic on Eastern Avenue and Fleet Street, as well as impact traffic on Lombard Street with shared use transit lanes and further reduction in the number of lanes under the I-895 bridge;
- This alignment would require an operating agreement with Norfolk Southern and the Canton Railroads; and
- The proposed station location is not in an optimum location for current residents and businesses or proposed redevelopment in Greektown neighborhood.

f. Kresson A Alignment from Boston Street

The Kresson A alignment was considered for BRT or LRT from Boston and Conkling Streets. The transitway would stay on the surface and follow the abandoned railroad right-of-way, cross under the O'Donnell Street Viaduct, and cross Haven Street at-grade following the abandoned railroad right-of-way and follow the east side of the inactive Norfolk Southern right-of-way to just north of Lombard Street where it would turn eastward to follow abandoned CSXT right-of-way. Ascending on an aerial structure the alignment would cross above Kresson Street, active CSXT right-of-way, and Norfolk Southern right-of-way and intermodal facility. The transitway would then return to the surface crossing under I-895 to the Bayview MARC Station, and continue at-grade across Lombard Street to the Bayview Medical Campus at the proposed extension of Mason Lord Drive. This alignment was eliminated from further study for the following reasons:

- This alignment would have greater impacts to CSXT property than other feasible alignments;

- This alignment would have more private property impacts than other feasible alignments; and
- This alignment would require an operating agreement with Norfolk Southern and the Canton Railroads.

g. Kresson C Alignment from Boston Street

The Kresson C alignment was considered for BRT or LRT from Boston and Conkling Streets. The transitway would stay on the surface and follow the abandoned railroad right-of-way, cross under the O'Donnell Street Viaduct, and cross Haven Street at grade and follow the east side of the inactive Norfolk Southern right-of-way to just north of Lombard Street where it would turn eastward to follow an abandoned CSXT right-of-way. Ascending on an aerial structure the alignment would cross above Kresson Street, and the active CSXT right-of-way. Remaining on the aerial structure the transitway would turn southeastward, and cross the vacant former lumber company property, and the southern edge of the Norfolk Southern right-of-way and intermodal facility. The transitway would return to the surface west of the I-895 corridor and cross under the roadway along the north side of Lombard Street to the Bayview MARC Station and to the Bayview Medical Campus at the proposed extension of Mason Lord Drive. This alignment was eliminated from further study for the following reasons:

- This alignment would have greater impacts to CSXT property than other feasible alignments;
- This alignment would have more private property impacts than other feasible alignments;
- The alignment would reduce the number of lanes on Lombard Street east of I-895 resulting in traffic impacts; and
- This alignment would require an operating agreement with Norfolk Southern and the Canton Railroads.

h. Northern Alignment from Boston Street

The Northern Alignment was considered for BRT or LRT from Boston and Conkling Streets. The transitway would stay on the surface and follow the abandoned railroad right-of-way, cross under the O'Donnell Street Viaduct, and cross Haven Street at-grade and follow the east side of the inactive Norfolk Southern right-of-way to a point near Fairmount Avenue where it would leave the inactive Norfolk Southern right-of-way and begin to turn eastward and ascend to an aerial structure that would follow the north side of Fayette Street east of Kresson Street. The aerial structure would cross above Fayette and Kresson Streets as well as the CSXT and active NS rights-of-way and the north end of the NS Lombard Street intermodal facility. This alignment was eliminated from further study for the following reasons:

- This alignment would have greater impacts to CSXT property than other feasible alignments;
- This alignment would require an operating agreement with Norfolk Southern and the Canton Railroads; and
- This alignment would impact publicly-owned parkland at Janney Street Park. This park is maintained by Baltimore City. According to the Section 4(f) of the

U.S. Department of Transportation Act of 1966 (49 U.S.C. 393[c]), the use of land from a publicly-owned parks or recreation area, wildlife or waterfowl refuge, or land from a significant historic site (as determined by the official having jurisdiction over the park, recreation area, refuge or site) only if there is **no prudent and feasible alternative** to using that land; and the project includes all possible planning to minimize harm to the park, recreation area, wildlife and waterfowl refuge, or historic site resulting from the use. As other prudent and feasible alternatives exist, this alternative was be eliminated from further consideration.

3. Alignment from Eastern/Fleet to Eastern Avenue

Beginning at Eastern Avenue/Fleet Street and Conkling Street, this alignment for BRT or LRT would continue along Eastern Avenue and Fleet Street on the surface across Haven Street. East of Haven Street, the alignment would descend into two tunnels crossing under the Norfolk Southern right-of-way (currently out of service). The Fleet Street tunnel would then curve northeastward to join with the tunnel under Eastern Avenue resulting in a paired tunnel. The paired tunnel would continue on the alignment of Eastern Avenue and ascend to the surface in a single portal after crossing under the I-895 corridor. The alignment would connect to a station on the Pemco property, at the intersection of Eastern Avenue and Bayview Boulevard. This alignment was eliminated from further study for the following reasons:

- This alignment does not provide direct access to the Bayview. Access to the heart of the Bayview Campus would require a walk of slightly more than a quarter of a mile or the implementation of a shuttle service;
- This alignment does not provide direct access to the proposed Bayview MARC Station. A shuttle service will be required to access the station; and
- Constructability would be challenging for the short distance from Haven Street to the inactive Norfolk Southern right-of-way. The grade between the surface and the bored tunnel would be approximately 8.6% due to the necessity of providing vertical clearance from the transitway to the bottom of a new bridge that would have to be built to carry the tracks now located in the railroad right-of-way.

4. Alignments from Eastern/Fleet to the Bayview MARC Station

a. Central Alignment from Eastern-Fleet

Beginning at Eastern Avenue/Fleet Street and Conkling Street, this alignment for BRT or LRT would continue along Eastern Avenue and Fleet Street on the surface across Haven Street. Continuing past Haven Street, it would cross the Canton Railroad's track at-grade, then would turn northward and follow the east side of the inactive Norfolk Southern right-of-way to a point near Bank Street where it would turn eastward passing through several small business and industrial properties on either side of Kresson Street and ascend to an aerial structure. The aerial structure would carry the transitway over the CSXT and active Norfolk Southern rights-of-way, one of the trucking company properties west of Oldham Street, as well as Oldham, Ponca and Lombard Streets. The

transitway would descend to the surface on the west side of I-895 after crossing above Lombard Street. The alignment would be at-grade on the west side of I-895 to the south end of the I-895 viaduct, crossing under the interstate to the Bayview MARC Station, and continue at-grade across Lombard Street to the Bayview Medical Campus at the proposed extension of Mason Lord Drive. This alignment was eliminated from further study for the following reasons:

- This alignment would have greater impacts to active commercial businesses than other feasible alignments under consideration. Acquisition of all or part of several businesses adjacent to the inactive Norfolk Southern right-of-way would be required for the aerial structure and associated piers within these properties;
- This alignment would require an operating agreement with Norfolk Southern and the Canton Railroads;
- This alignment would cross through the proposed development at North Greektown on an aerial structure; and
- There are other feasible alignments with similar capital cost investments and without greater property impacts.

b. Lombard Alignment from Eastern-Fleet

Beginning at Eastern Avenue/Fleet Street and Conkling Street, this alignment for BRT or LRT would continue along Eastern Avenue and Fleet Street on the surface across Haven Street. Continuing past Haven Street it would cross the Canton Railroad's track at grade, then would turn northward and follow the east side of the inactive Norfolk Southern right-of-way to Lombard and Janney Streets. The alignment would turn east and would be in shared lanes on Lombard Street to Ponca Street, the alignment would then shift to northside of Lombard Street under I-895 to the proposed Bayview MARC stationand continue at-grade across Lombard Street on the Bayview Medical Campus at the proposed extension of Mason Lord Drive. This alignment was eliminated from further study for the following reasons:

- This alignment would require acquisition of business and residential properties between the Norfolk Southern right-of-way and Janney Street and more properties would need to be acquired if there was insufficient clearance at the existing CSXT bridge,
- This alignment would have adverse impacts to traffic on Eastern Avenue and Fleet Street, as well as impact traffic on Lombard Street with shared use transit lanes and further reduction in the number of lanes under the I-895 bridge;
- This alignment would require an operating agreement with Norfolk Southern and the Canton Railroads;
- There would be impacts to residences and parking along Lombard Street; and
- The proposed station location is not in an optimum location for current residents and businesses, or proposed redevelopment in Greektown neighborhood.

c. Kresson A Alignment from Eastern-Fleet

Beginning at Eastern Avenue/Fleet Street and Conkling Street, this alignment for BRT or LRT would continue along Eastern Avenue and Fleet Street on the surface across Haven Street. Continuing past Haven Street the alignment would turn north following the east side of the inactive Norfolk Southern right-of-way to just north of Lombard Street where it would turn eastward to follow an abandoned CSXT right-of-way. Ascending on an aerial structure the alignment would cross above Kresson Street, active CSXT right-of-way, and Norfolk Southern right-of-way and intermodal facility. The transitway would then return to the surface crossing under I-895 to the Bayview MARC Station, and continue at-grade across Lombard Street to the Bayview Medical Campus at the proposed extension of Mason Lord Drive. This alignment was eliminated from further study for the following reasons:

- This alignment would have greater impacts to CSXT property than other feasible alignments;
- This alignment would have more private property impacts than other feasible alignments; and
- This alignment would require an operating agreement with Norfolk Southern and the Canton Railroads.

d. Kresson C Alignment from Eastern-Fleet

Beginning at Eastern Avenue/Fleet Street and Conkling Street, this alignment for BRT or LRT would continue along Eastern Avenue and Fleet Street on the surface across Haven Street. Continuing past Haven Street the alignment would turn north following the east side of the inactive Norfolk Southern right-of-way to just north of Lombard Street where it would turn eastward to follow an abandoned CSXT right-of-way. Ascending on an aerial structure the alignment would cross above Kresson Street, and the active CSXT right-of-way. Remaining on the aerial structure the transitway would turn southeastward, and cross the vacant former lumber company property, and the southern edge of the Norfolk Southern right-of-way and intermodal facility. The transitway would return to the surface west of the I-895 corridor and cross under the roadway along the north side of Lombard Street to the Bayview MARC Station and to the Bayview Medical Campus at the proposed extension of Mason Lord Drive. This alignment was eliminated from further study for the following reasons:

- This alignment would have greater impacts to CSXT property than other feasible alignments;
- This alignment would have more private property impacts than other feasible alignments;
- The alignment would reduce the number of lanes on Lombard Street east of I-895 resulting in traffic impacts; and
- This alignment would require an operating agreement with Norfolk Southern and the Canton Railroads.

e. Northern Alignment from Eastern-Fleet

Beginning at Eastern Avenue/Fleet Street and Conkling Street, this alignment for BRT or LRT would continue along Eastern Avenue and Fleet Street on the surface across

Haven Street. Continuing past Haven Street the alignment would turn north following the east side of the inactive Norfolk Southern right-of-way to a point near Fairmount Avenue where it would leave the inactive Norfolk Southern right-of-way and begin to turn eastward and ascend to an aerial structure that would follow the north side of Fayette Street east of Kresson Street. The aerial structure would cross above Fayette and Kresson Streets as well as the CSXT and active NS rights-of-way and the north end of the NS Lombard Street intermodal facility. This alignment was eliminated from further study for the following reasons:

- This alignment would have greater impacts to CSXT property than other feasible alignments;
- This alignment would require an operating agreement with Norfolk Southern and the Canton Railroads; and
- This alignment would impact publicly-owned parkland at Janney Street Park. This park is maintained by Baltimore City. According to the Section 4(f) of the U.S. Department of Transportation Act of 1966 (49 U.S.C. 393[c]), the use of land from a publicly-owned parks or recreation area, wildlife or waterfowl refuge, or land from a significant historic site (as determined by the official having jurisdiction over the park, recreation area, refuge or site) only if there is **no prudent and feasible alternative** to using that land; and the project includes all possible planning to minimize harm to the park, recreation area, wildlife and waterfowl refuge, or historic site resulting from the use. As other prudent and feasible alternatives exist, this alternative was be eliminated from further consideration.

f. Summary

Table 4 summarizes the evaluation of the Bayview Alignments.

C. ALIGNMENTS RETAINED

Two alignments, Kresson B Alignment from Boston Street and Kresson B Alignment from Eastern-Fleet were retained and incorporated into the Red Line Corridor Transit Study. These two alignments were retained because they best meet the goals for an extension of the Red Line to Bayview. These alignment serve the Bayview Campus, provide for an intermodal connection at the proposed Bayview MARC Station and a park-and-ride lot for Red Line commuters with easy access to I-95 or I-895.

Table 4: Evaluation Summary of Bayview Alignments

Alignment	Direct Access to Bayview	Direct Connection to MARC	No/Very Minor Property Impacts	Econ. Dev. Opportunities	Compatible with freight operations	Impacts to residences & parking	Impacts to businesses	Low Impact to Traffic	Low Env./ Contamination Concerns	Construction Challenges	Capital Costs (in millions)
Boston Street to Eastern Avenue Group											
Pemco Alignment								✓		✓	$136.3
Oldham Alignment						✓	✓	✓		✓	$141.2
Greektown Alignment						✓	✓	✓	✓	✓	$119.6
Haven Alignment						✓	✓	✓		✓	$160.8
Boston Street to Bayview MARC Station Group											
Crown East Alignment	✓	✓		✓	✓			✓	✓		$234.4
Crown West Alignment	✓	✓	✓	✓	✓			✓		✓	$305.6
Canton Railroad Alignment	✓	✓			✓			✓			$197.5
Central Alignment	✓	✓			✓			✓	✓		$186.4
Lombard Alignment	✓	✓		✓	✓	✓	✓		✓	✓	$139.4
Kresson A Alignment	✓	✓		✓	✓			✓			$191.0
Kresson B Alignment	✓	✓		✓	✓			✓			$191.5
Kresson C Alignment		✓		✓	✓					✓	$156.6
Northern Alignment	✓	✓		✓	✓			✓			$195.0
Eastern/Fleet to Eastern Avenue Group											
Eastern-Fleet Alignment			✓				✓			✓	$132.3
Eastern/Fleet to Bayview MARC Station Group											
Central Alignment	✓	✓			✓		✓	✓	✓		$158.3
Lombard Alignment	✓	✓			✓	✓	✓	✓	✓	✓	$111.2
Kresson A Alignment	✓	✓			✓	✓	✓	✓			$163.0
Kresson B Alignment	✓	✓			✓	✓	✓	✓			$163.5
Kresson C Alignment		✓			✓	✓	✓	✓		✓	$128.6
Northern Alignment	✓	✓			✓	✓	✓	✓			$167.0

V. Alternatives Retained for Detailed Study

V. ALTERNATIVES RETAINED FOR DETAILED STUDY

Four Alternatives have been retained for detailed study for the Red Line Corridor Transit Study. This chapter of the Alternatives Technical Report provides an overview of the alternatives and options that have been retained. These alternatives and options will be compared and analyzed in the Red Line Alternatives Analysis/Draft Environmental Impact Statement Document (AA/DEIS). The four alternatives are:

- Alternative 1: No Build – the present system plus the committed transportation improvements
- Alternative 2: Transportation System Management – lower investment improvements to the existing bus service
- Alternative 3: Bus Rapid Transit
- Alternative 4: Light Rail Transit

Within Alternatives 2, 3, and 4, there are different options for the location of the transit alignment and/or design and operational approaches within that alignment. The options are intended to provide choices that can be combined within the proposed alternatives.

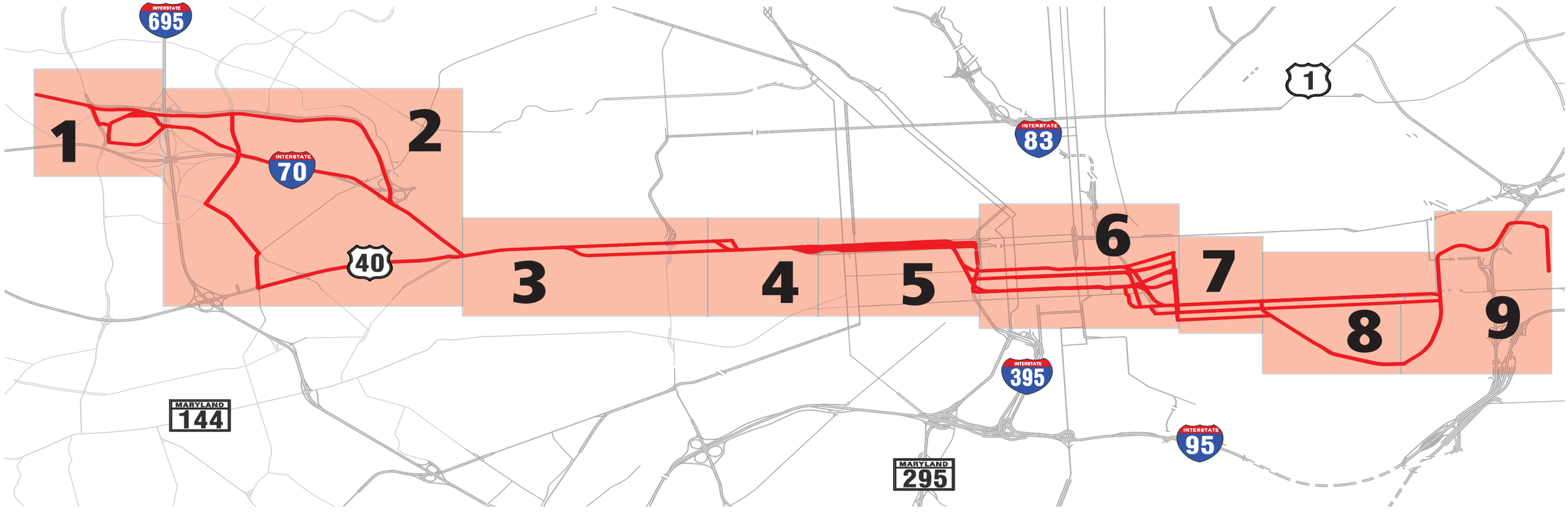
For the purposes of describing the alternatives and options, the corridor has been divided into eight geographical areas as shown in **Figure 4**. In the description of each of the alternatives, a table follows which further divides these geographical areas into subareas. Within the subareas, the options being considered are briefly described and general typical sections are shown. Appendix A of this technical report, the Limits of Distrubance, Plans and Profiles Drawings, shows further detail on the options. Chapter 2 of the AA/DEIS, also presents the options by geographic area.

Two types of operation are assumed: dedicated and shared. **Dedicated** transit service is characterized by transit vehicles operating in an exclusive transitway or a lane separated from general traffic, with the flexibility to share turn lanes where right-of-way is limited. **Shared** transit service shares travel lane(s) with general vehicular traffic.

A. ALTERNATIVE 1: NO BUILD

The No-Build Alternative is the baseline against which the other alternatives are compared. It consists of the existing road and transit network as well as planned and programmed improvements, in the region's adopted, financially constrained long-range plan, *Transportation 2030*, approved by the Baltimore Regional Transportation Board in December, 2004. This includes the Route 40 express bus service.

FIGURE 4- GEOGRAPHIC AREAS



ALTERNATIVE 2: *TRANSPORTATION SYSTEM MANAGEMENT*

Transportation System Management (TSM) represents the best that can be done for mobility in the corridor without constructing a new transit guideway. This alternative emphasizes upgrades to existing transit service through operational and minor physical improvements. It could also include selected street upgrades such as intersection improvements, minor widenings and other focused traffic engineering. TSM falls between the No-Build alternative and the build alternatives in terms of both costs and impacts.

Examples of features that could be included in the TSM alternative:

- Expanded routing and availability of MTA buses
- Improved quality of transit service with more frequency and traffic signal preemption
- Better transit coordination, support facilities and marketing
- Improved accessibility with complimentary modes such as bicycles and walking
- More parking and bus lanes
- New bus stops that would have shelters and amenities comparable to those proposed for the build alternatives, plus some improvements to adjacent sidewalks for access and compliance with the Americans with Disabilities Act (ADA).
- Signal priority and/or queue jump lanes at major intersections, where practical, if the analysis demonstrates that such priority provides substantial time savings.

For the Red Line Corridor Transit Study, TSM is identified as Alternative 2. Alternative 2 would generally provide bus operations along existing roadways in dedicated curb lanes marked for buses and right-turning traffic only. In some places where right-of-way is constrained, the buses would operate in shared lanes with vehicular traffic. The alignment and operations of Alternative 2 are shown in Figure 5 below and presented in Table 5. This table briefly describes the options by geographic area.

What is signal priority?

Traffic signal priority gives special treatment to transit vehicles at signalized intersections.

What is a queue jump lane?

A queue jump lane, typically found with BRT or other dedicated bus systems, consists of an additional roadway lane at an intersection restricted to transit vehicles. A separate traffic signal phase allows the bus in the queue jump lane to jump ahead of other traffic, reducing travel times and improving reliability.

FIGURE 5- ALTERNATIVE 2: TRANSPORTATION SYSTEMS MANAGEMENT

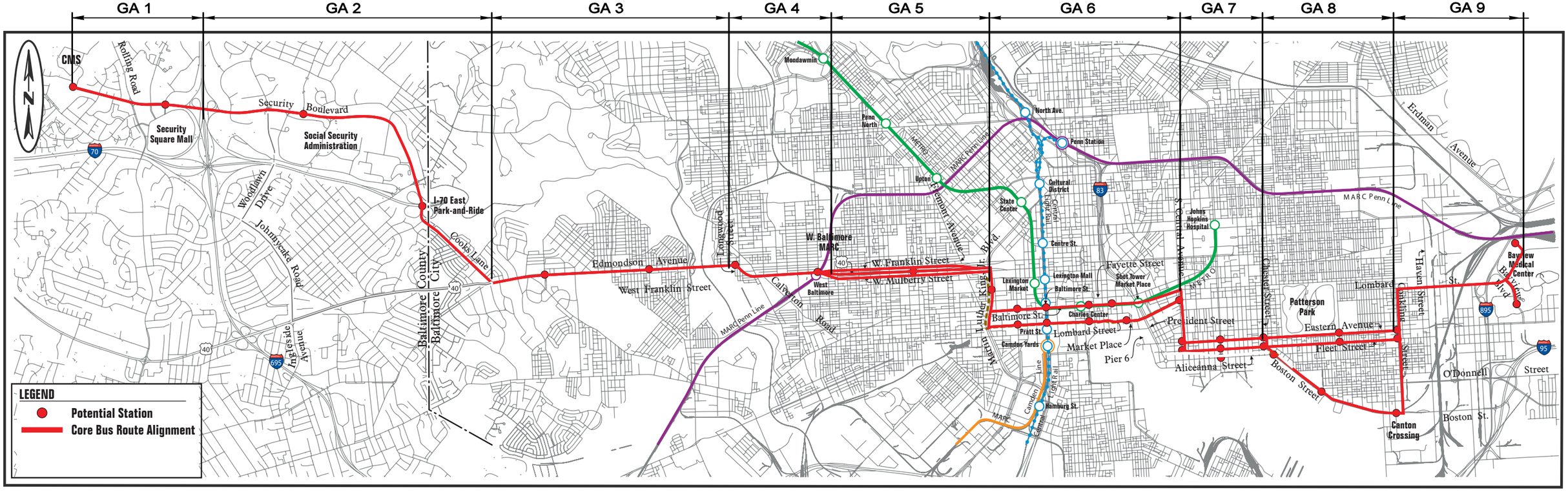
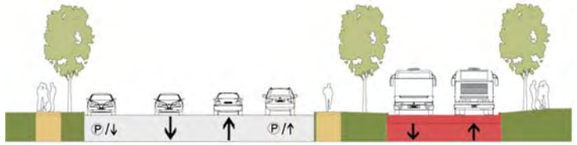


Table 5: Alternative 2, TSM, Options

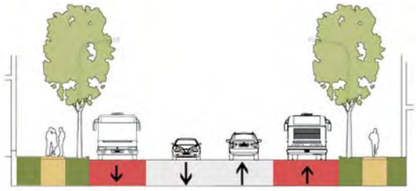
GA	Subarea	Surface or Tunnel	Option Description	Typical Section (Figure 6)	Appendix A LOD PAGES
1	Security Boulevard, from CMS to Rolling Road	Surface	Shared transit lane curbside eastbound and shared transit median lane westbound	TS 1	GA 1: 1-2
	Security Square Mall Area, from Rolling Road to I-695	Surface	Shared transit/traffic lanes in each direction on Security Boulevard	TS 1	GA 1: 27-29
2	I-695 Area, from I-695 to Woodlawn Drive	Surface	Shared transit/traffic lanes in each direction on Security Boulevard	TS 1	GA 2: 8-9
	Social Security Administration Area, from Woodlawn Drive to I-70 East Park-and-Ride	Surface	Dedicated curbside transit lane in each direction on Security Boulevard, 2 traffic lanes in each direction	TS 3	GA2: 24-29
	I-70 East Park-and-Ride	Surface	Multiple options for a surface parking lot	--	GA 2: 64-69
	Cooks Lane, from I-70 East Park-and-Ride to US 40	Surface	Shared transit/traffic lanes in each direction, full time parking on each side	TS 1	GA 2: 79-81
3	US 40 from Cooks Lane to Longwood Street	Surface	Dedicated transit curbside, 2 traffic lanes, no parking, peak period, peak direction; shared transit/traffic, 2 traffic lanes, curbside parking all other times.	TS 3	GA 3:13-18
4	US 40 from Longwood Street to West Baltimore MARC	Surface	Dedicated transit curbside, 2 traffic lanes, no parking, peak period, peak direction; shared transit/traffic, 2 traffic lanes, curbside parking all other times.	TS 3	GA 4: 10-12
5	Franklin/US 40/Mulberry from W. Baltimore MARC to Martin Luther King, Jr. Boulevard.	Surface	Shared transit/traffic lanes with split service on Franklin, US 40, and Mulberry.	TS 1	GA 5:22-25
	Martin Luther King, Jr. Boulevard from US 40 to Lombard Street	Surface	Shared transit/traffic lanes on Martin Luther King, Jr. Boulevard	TS 1	GA 5:28-29
6	Fayette/Baltimore/ Lombard, from Martin Luther King Jr. Boulevard to Market Place	Surface	Dedicated transit curbside on Baltimore Street-Lombard Street couplet. On Baltimore, 2 eastbound traffic lanes, 1 parking lane left curb full time. On Lombard, 3-5 westbound traffic lanes, no parking on either curb.	TS 11	GA 6: 5-8

GA	Subarea	Surface or Tunnel	Option Description	Typical Section (Figure 6)	Appendix A LOD PAGES
6	Baltimore/Lombard/Central/Pier 6 from Market Place to Central Avenue, at Aliceanna Street	Surface	Dedicated transit on Baltimore Street-Lombard Street couplet. On Baltimore, eastbound transit curbside, 2 eastbound traffic lanes, 1 parking lane left curb full time. On Lombard, westbound transit second lane out, 1-3 westbound traffic lanes, no parking on left curb. On Central Avenue, dedicated transit second lane out, 1 traffic lane in each direction with center left turn lane, 1 parking lane on each right curb full time.	Baltimore St.- TS 11 Lombard St.-TS 10 Central Ave.- TS 13	GA 6: 19-20
7	Eastern/Fleet/Aliceanna Streets, from Central Avenue to Chester Street	Surface	Dedicated transit curbside on Eastern-Fleet couplet peak period only, shared transit off-peak. One traffic lane per direction on both Eastern and Fleet. Full-time parking eastbound curb lane on Eastern, westbound curb lane on Fleet. Off-peak parking westbound curb lane on Eastern, eastbound curb lane on Fleet.	TS 11	GA 7:10-12
8	Eastern/Fleet/Boston Streets, from Chester Street to Haven Street	Surface	Split transit service among Eastern-Fleet and Boston Street: Dedicated transit curbside on Eastern-Fleet couplet peak period only, shared transit off-peak. One traffic lane per direction on both Eastern and Fleet. Full-time parking eastbound curb lane on Eastern, westbound curb lane on Fleet. Off-peak parking westbound curb lane on Eastern, eastbound curb lane on Fleet. Shared transit/traffic lanes on Chester and Boston Streets.	Eastern, Fleet & Boston Sts- TS 3 Chester & Boston Sts- TS 1	GA 8: 16-25
9	Conkling Street to Bayview Medical Center	Surface	Shared lanes on Conkling and Lombard Streets to North Bayview Station. Shared lanes on Bayview Boulevard to Bayview Station.	TS 1	GA 9: 8-14 & 18-21

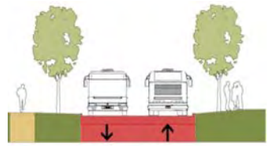
TS1- Shared Transit / Traffic



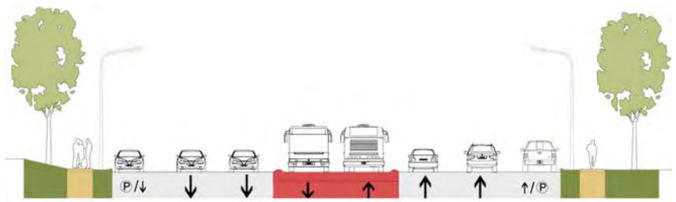
TS2 - Transit on New Dedicated Right-of-Way, Adjacent to Roadway



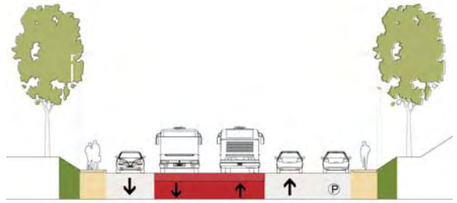
TS3 - Dedicated Curb Lane



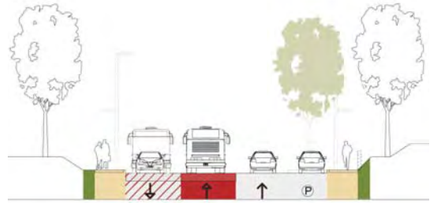
TS4 - Transit on New Dedicated Right-of-Way



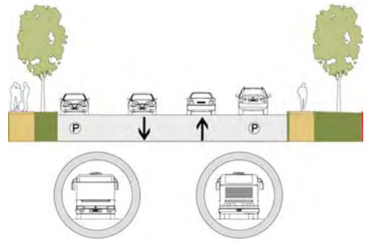
TS5 - Transit in Median



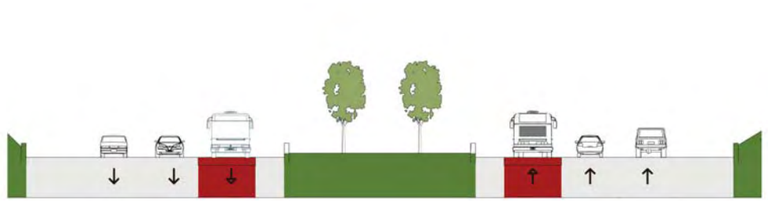
TS6 - Transit in Median, Parking on One Side



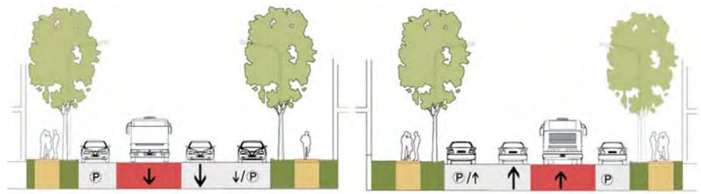
TS7 - 1 Shared Lane, 1 Dedicated Lane. Parking on One Side



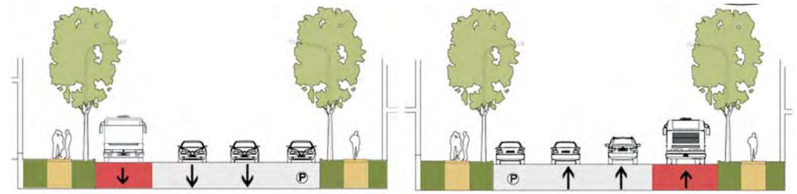
TS8 - Tunnel Under Street



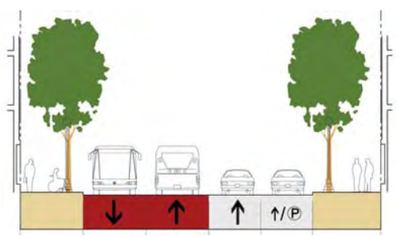
TS9 - Transit in Existing Left Most Lanes



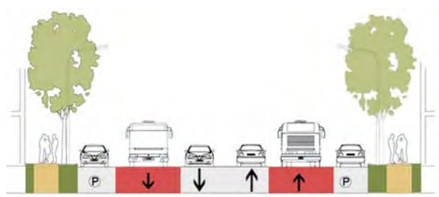
TS10 - Transit Couplet Second Lane Out, 1-Way Traffic



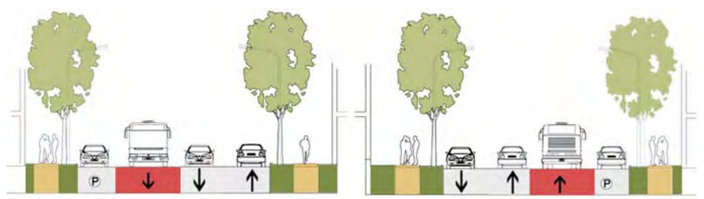
TS11 - Transit Couplet Curbside



TS12- Transit on One Side of Existing Street



TS13 - Transit Second Lane Out



TS14 - Transit Couplet Second Lane Out, 2-Way Traffic

FIGURE 6 - *Typical Sections for Options:*

Alternative 2: TSM and
Alternative 3: Bus Rapid Transit

MTA Maryland

Note:
These typical sections represent the basic design concepts. The proposed number of travel lanes and parking lanes and whether sidewalks are proposed will vary for different streets. See Plans and Profiles for specific information.

ALTERNATIVE 3: *BUS RAPID TRANSIT*

Three components define Alternative 3, the mode, alignments and options. The mode for Alternative 3 is Bus Rapid Transit (BRT). There are different routes under consideration that the BRT could operate along horizontally and vertically. The horizontal alignments extend west to east from CMS and Security Square Mall to Bayview. The vertical alignments include surface, varying lengths of tunnel and aerial structures at the east end of the corridor. These alignments are shown in Figure 7 and listed below by geographic area.

GEOGRAPHIC AREA 1
Along Security Boulevard to the north side or south side of the mall or continuing along Security Boulevard.

GEOGRAPHIC AREA 2
Continuing along Security Boulevard or along the central alignment to the I-70 East Park-and-Ride and Cooks Lane at US 40. Also, a BRT alignment that is unique to just Alternative 3 is along Security Boulevard, along Woodlawn Drive, Johnnycake Road, Ingleside Avenue and US 40.

GEOGRAPHIC AREAS 3 & 4
The alignments continue along US 40 at the surface or in a tunnel.

GEOGRAPHIC AREA 5
There are three surface alignments under consideration in this geographic area: along US 40 in the lower level, Franklin Street or Mulberry Street. It would then continue along Martin Luther King Boulevard on surface or in a tunnel. There are two tunnel alignments (with several portal locations) also under consideration in this area: under Fremont Avenue or under Martin Luther King Boulevard.

GEOGRAPHIC AREA 6
The alignments in this geographic area continue from Martin Luther King Boulevard through downtown on surface alignments along Baltimore and/or Lombard Streets to Central Avenue or after Market Place there are surface alignments along Piers 5 and 6 to alignments on Eastern Avenue and Fleet Street. There are tunnel alignments also under consideration through downtown under Lombard or Fayette Streets to Central Avenue or the tunnel could continue to the south and east under Eastern Avenue.

GEOGRAPHIC AREA 7
Along Central Avenue there are surface alignments to Eastern/Fleet or Fleet/Aliceanna couplets. The alignments then continue east or west along either of these surface couplets or in a tunnel alignment under Eastern Avenue.

GEOGRAPHIC AREA 8
At Chester Street, the surface alignments would either continue along the Eastern/Fleet couplet or along Boston Street. The tunnel alignment under Eastern Avenue continues through this geographic area.

GEOGRAPHIC AREA 9
From Conkling Street to just east of Haven Street, the surface alignments continue from either Boston Street or Eastern Avenue. The Eastern Avenue tunnel alignment would portal near Haven Street.

There is only one surface alignment to the terminus of the study at Bayview. The surface alignment would be on new right-of-way following this general alignment: along the Norfolk Southern railroad to an aerial structure over active freight rail lines. The alignment transitions back to grade along the west side of I-895, under I-895 to an alignment on new right-of-way to Bayview Medical Center.

Along all the alignments under consideration, there are different approaches to how the BRT would operate; these operational approaches are called options. Options under consideration include whether the transit would operate in a shared or dedicated lane with vehicular traffic, or whether introducing transit onto a street results in the removal of a parking lane. The location and operational details of the options for Alternative 3: BRT are presented in Table 6.

FIGURE 7- ALTERNATIVE 3: BUS RAPID TRANSIT

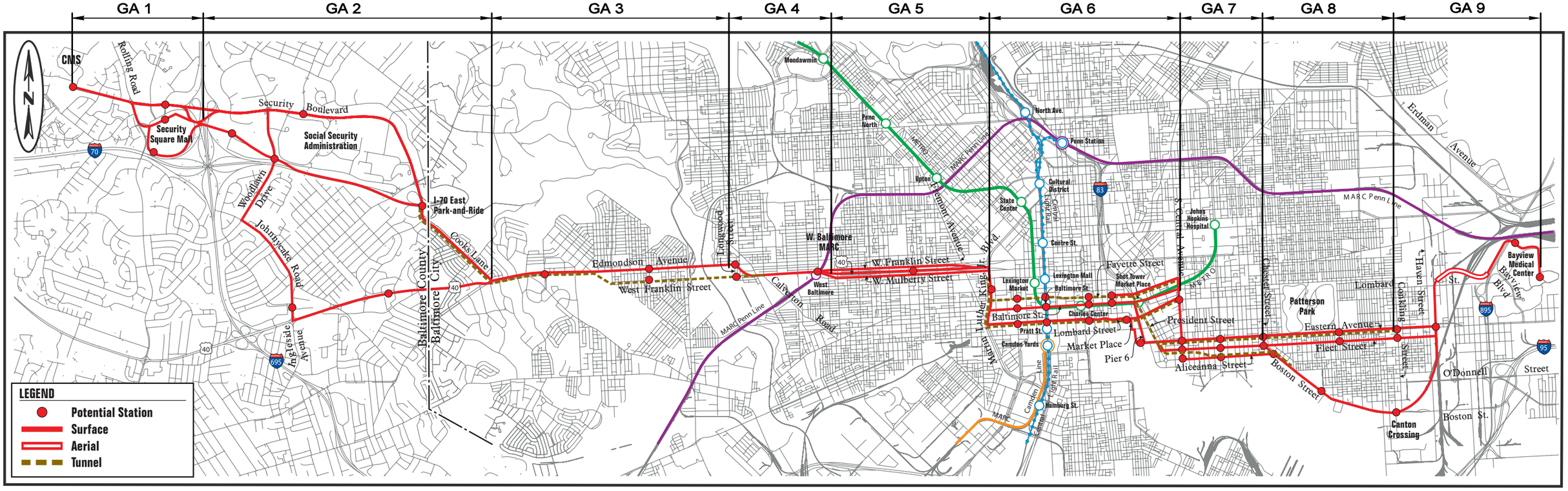


Table 6: Alternative 3, Bus Rapid Transit -- Options

GA	Subarea	Surface or Tunnel	Option Description	Typical Section (Figure 6)	Appendix LOD PAGES
1	Security Boulevard from CMS to Rolling Road	Surface	Shared transit lane curbside eastbound and shared transit median lane westbound	TS1	GA 1: 1-2
	Security Square Mall Area from Rolling Road to I-695	Surface	Dedicated transit on south side of Security Boulevard	TS2	GA 1: 3-8
		Surface	Shared transit/traffic lanes in each direction on Rolling Road, dedicated transit on north side of mall	Rolling Road – TS1; N Side of Mall – TS3	GA 1: 13-16
		Surface	Shared transit/traffic lanes in each direction on Rolling Road, dedicated transit on south side of mall	Rolling Road – TS1; S Side of Mall – TS4	GA 1:17-26
2	I-695 Area from I-695 to Woodlawn Drive	Surface	Dedicated transit on south side of Security Boulevard	TS2	GA 2: 1-4
		Surface	Dedicated transit on the central alignment between I-70 and Security Boulevard	TS4	GA 2: 5-7
	Social Security Administration Area from Woodlawn Drive to I-70 East Park-and-Ride	Surface	Dedicated transit on south side of Security Boulevard, 2 traffic lanes eastbound, 3 traffic lanes westbound	TS2	GA 2: 10-15
		Surface	Dedicated transit on north side of I-70	TS2	GA 2: 16-19
		Surface	Dedicated transit in median of I-70	TS5	GA 2: 20-23
	Woodlawn/Johnny-cake/Ingleside from Woodlawn Drive to US 40 at Cooks Lane	Surface	Dedicated curbside transit lanes on Woodlawn, 1 traffic lane in each direction, no parking. Shared transit/traffic lanes on Johnnycake and Ingleside in each direction, full time parking in curb lanes.	Woodlawn – TS3; Johnnycake, Ingleside – TS1	GA 2: 30-51
		Surface	Dedicated transit in median of US 40, 3 traffic lanes in each direction, no parking.	TS5	GA 2: 52-57
		Surface	Dedicated transit in existing left most lanes of US 40, 2 traffic lanes in each direction, no parking.	TS9	GA 2:58-63
	I-70 East Park-and-Ride	Surface	Multiple options for location of surface parking lot including with and without maintenance facility	--	GA 2: 64-69
	Cooks Lane from I-70 East Park-and-Ride to US 40	Surface	Dedicated transit in median, one lane of traffic in each direction, full time parking on west side	TS6	GA 2: 70-72
		Surface	Dedicated transit eastbound, one lane of traffic eastbound, shared transit/traffic westbound, full time parking on west side	TS7	GA 2: 73-75

GA	Subarea	Surface or Tunnel	Option Description	Typical Section (Figure 6)	Appendix LOD PAGES
		Surface	Shared transit/traffic lanes in each direction, full time parking on west side	TS1	GA 2: 76-78
		Tunnel	Cooks Lane tunnel	TS8	GA 82-85
3	US 40 from Cooks Lane to Longwood Street	Surface	Dedicated transit in median, 3 traffic lanes peak period, peak direction, no parking; 2 traffic lanes peak period, off-peak direction, one lane of parking	TS5	GA 3: 1-6
		Surface	Dedicated transit in median, 2 traffic lanes in each direction w/ full time parking in curb lane	TS5	GA 3: 7-12
		Tunnel	US 40 and West Franklin Street Tunnel to Calverton Road	TS8	GA 3: 19-25
4	US 40 from Longwood Street to West Baltimore MARC	Surface	Dedicated transit on north side and/or in median of Franklin Street, 3 traffic lanes peak period, peak direction, no parking; 2 traffic lanes peak period, off-peak direction, one lane of parking. Outbound traffic is diverted from Franklin Street to Franklintown Road and Edmondson Avenue.	TS5	GA 4: 1-3
		Surface	Dedicated transit on north side of Franklin Street, 3 traffic lanes eastbound, 1 traffic lane westbound, full time parking in westbound curb lane. On Edmondson Avenue, 3 traffic lanes westbound peak period, peak direction, no parking; 2 traffic lanes westbound peak period, off-peak direction, one lane of parking; 1 traffic lane eastbound, full time parking in eastbound curb lane.	TS5	GA 4: 4-6
		Surface	Dedicated transit in median, 2 traffic lanes in each direction w/ full time parking in curb lane	TS5	GA4: 7-9
		Tunnel	US 40 and West Franklin Street Tunnel to Calverton Road	TS8	GA 4: 13-14

GA	Subarea	Surface or Tunnel	Option Description	Typical Section (Figure 6)	Appendix LOD PAGES
5	Franklin/US 40/Mulberry from West Baltimore MARC to Martin Luther King, Jr. Boulevard	Surface	Dedicated transit in existing left most lanes of US 40, 2 traffic lanes in each direction	TS9	GA 5: 10-13
		Surface	Dedicated transit on south side of Franklin Street	TS2	GA 5: 14-17
		Surface	Dedicated transit on north side of Mulberry Street	TS2	GA 5: 18-21
	Martin Luther King, Jr. Boulevard from US 40 to Lombard Street	Surface	Dedicated transit on west side of Martin Luther King, Jr. Boulevard	TS2	GA 5: 26-29
		Tunnel	Martin Luther King, Jr. Boulevard tunnel with various portal locations	TS8	GA 5: 30
6	Fayette/Baltimore/ Lombard from Martin Luther King Jr. Boulevard to Market Place	Surface	Dedicated transit in second lane out on Baltimore Street-Lombard Street couplet. On Baltimore, 2 eastbound traffic lanes, 1 parking lane right curb full time. On Lombard, 3-5 westbound traffic lanes, 1 parking lane right curb full time.	TS10	GA 6: 1-4
		Surface	Dedicated transit curbside on Baltimore Street-Lombard Street couplet. On Baltimore, 2 eastbound traffic lanes, 1 parking lane left curb full time. On Lombard, 3-5 westbound traffic lanes, no parking on either curb.	TS11	GA 6: 5-8
		Surface	Dedicated transit (two-way) on north side of Baltimore Street, 1 traffic lane eastbound, intermittent parking in right curb lane	TS12	GA 6: 5-8
		Tunnel	Fayette Street tunnel	TS8	GA 6: 25, 27-35
		Tunnel	Lombard Street tunnel	TS8	GA 6: 26, 47-58

GA	Subarea	Surface or Tunnel	Option Description	Typical Section (Figure 6)	Appendix LOD PAGES
6	Baltimore/ Lombard/ Central/Pier 5/6 from Market Place to Central Avenue at Aliceanna Street	Surface	Dedicated transit in second lane out on Baltimore Street-Lombard Street couplet to Central Avenue. On Baltimore, 2 eastbound traffic lanes, 1 parking lane right curb full time. On Lombard, 1-3 westbound traffic lanes, 1 parking lane right curb full time.	TS10	GA 6: 13-14
		Surface	Dedicated transit on Baltimore Street-Lombard Street couplet to Central Avenue. On Baltimore, eastbound transit curbside, 2 eastbound traffic lanes, 1 parking lane left curb full time. On Lombard, westbound transit second lane out, 1-3 westbound traffic lanes, no parking on left curb.	Baltimore – TS11; Lombard – TS10	GA 6: 15-16
		Surface	Dedicated transit (two-way) on north side of Baltimore Street to Central Avenue, 1 traffic lane eastbound, intermittent parking in right curb lane	TS12	GA 6: 17-18
		Tunnel	Fayette Street tunnel with various portal locations to Central Avenue	TS8	GA 6: 25, 27-35
		Tunnel	Lombard Street tunnel with various portal locations to Central Avenue	TS8	GA 6: 26, 47-58
		Tunnel	Fayette Street tunnel, continuing to Eastern Avenue tunnel	TS8	GA 6: 36-38
		Tunnel	Lombard Street tunnel, continuing to Eastern Avenue tunnel	TS8	GA 6: 59-61
		Surface	From Market Place to President Street, dedicated transit curbside W. Falls Avenue-Harbor Magic Way Couplet to Eastern-Fleet couplet	TS11	GA 6: 21-22
		Surface	Dedicated transit second lane out on Central Avenue, 1 traffic lane in each direction with center left turn lane, 1 parking lane on each right curb full time	TS13	GA 6: 19-20
		Surface	Dedicated transit second lane out Eastern-Fleet couplet, one-way traffic on Eastern-Fleet, w/ 2 traffic lanes peak direction, right curb parking full-time; 1 traffic lane off-peak direction, parking both curbs	TS10	GA 6: 24
		Surface	Dedicated transit second lane out Eastern-Fleet Couplet, one-way traffic on Eastern-Fleet w/ 1 traffic lane, full-time parking both curbs	TS10	GA 6: 23
		Surface	Dedicated transit second lane out Eastern-Fleet Couplet, two-way traffic on Eastern-Fleet w/ 1 lane in each direction, full time parking right curb only	TS14	GA 6: 23

GA	Subarea	Surface or Tunnel	Option Description	Typical Section (Figure 6)	Appendix LOD PAGES
7	Eastern/Fleet/ Aliceanna Streets from Central Avenue to Chester Street	Surface	Dedicated transit second lane out Eastern-Fleet couplet, one-way traffic on Eastern-Fleet, w/ 2 traffic lanes peak direction, right curb parking full-time; 1 traffic lane off-peak direction, parking both curbs	TS10	GA 7: 1-5
		Surface	Dedicated transit second lane out Eastern-Fleet Couplet, one-way traffic on Eastern-Fleet w/ 1 traffic lane, full-time parking both curbs	TS10	GA 7: 1
		Surface	Dedicated transit second lane out Eastern-Fleet Couplet, two-way traffic on Eastern-Fleet w/ 1 lane in each direction, full time parking right curb only	TS14	GA 7: 1
		Surface	Dedicated transit second lane out Fleet-Aliceanna couplet, one-way traffic on Fleet-Aliceanna w/ 2 traffic lanes peak direction, right curb parking full-time; 1 traffic lane off-peak direction, parking both curbs	TS10	GA 7: 6-9
		Surface	Dedicated transit second lane out Fleet-Aliceanna Couplet, one-way traffic on Fleet-Aliceanna w/ 1 traffic lane, full-time parking both curbs	TS10	GA 7: 6
		Surface	Dedicated transit second lane out Fleet-Aliceanna Couplet, two-way traffic on Fleet-Aliceanna w/ 1 lane in each direction, full time parking right curb only	TS14	GA 7: 6
		Tunnel	Eastern Avenue tunnel	TS8	GA 6: 39-46
8	Eastern/Fleet/ Boston Streets from Chester Street to Conkling Street	Surface	Dedicated transit second lane out Eastern-Fleet couplet, one-way traffic on Eastern-Fleet, w/ 2 traffic lanes peak direction, right curb parking full-time; 1 traffic lane off-peak direction, parking both curbs	TS10	GA 8: 1-5
		Surface	Dedicated transit second lane out Eastern-Fleet Couplet, one-way traffic on Eastern-Fleet w/ 1 traffic lane, full-time parking both curbs	TS10	GA 8: 1
		Surface	Dedicated transit second lane out Eastern-Fleet Couplet, two-way traffic on Eastern-Fleet w/ 1 lane in each direction, full time parking right curb only	TS14	GA 8: 1
		Surface	Dedicated transit in median of Boston Street, 2 traffic lanes in each direction, full time parking westbound right curb	TS5	GA 8: 6-10
		Surface	Dedicated transit on south side of Boston Street, 1 traffic lane in each direction with continuous left turn lane, full time parking westbound right curb	TS2	GA 8: 11-15
		Tunnel	Eastern Avenue tunnel	TS8	GA 6: 39-46

9	Conkling Street to Norfolk Southern/ Canton Railroad	Surface	Dedicated transit second lane out Eastern-Fleet couplet, one-way traffic on Eastern-Fleet, w/ 2 traffic lanes peak direction, right curb parking full-time; 1 traffic lane off-peak direction, parking both curbs	TS10	GA 9: 2-3
		Surface	Dedicated transit second lane out Eastern-Fleet Couplet, one-way traffic on Eastern-Fleet w/ 1 traffic lane, full-time parking both curbs	TS10	GA 9: 1
		Surface	Dedicated transit second lane out Eastern-Fleet Couplet, two-way traffic on Eastern-Fleet w/ 1 lane in each direction, full time parking right curb only	TS14	GA 9: 1
		Tunnel	Eastern Ave. tunnel	TS8	GA 6: 39-46
		Surface	From Boston St. and Conkling Street on abandoned N-S railroad right-of-way		GA 9: 4-7
	Norfolk Southern/ Canton Railroad at Eastern Avenue to Bayview MARC Station	Aerial & Surface	at-grade in inactive N-S railroad right-of-way; aerial structure over active N-S railroad to dedicated surface alignment north of Lombard Street on west side of I-895, under I-895		GA 9: 15-17
	Bayview MARC Station to Bayview Medical Center	Surface	Alignment on new right-of-way to Mason Lord Drive, dedicated transit on east side of Mason Lord Drive	TS2	GA 9: 22-24

ALTERNATIVE 4: *LIGHT RAIL TRANSIT*

Three components define Alternative 4, the mode, alignments and options. The mode for Alternative 4 is Light Rail Transit (LRT). There are different routes under consideration that the LRT could operate along horizontally and vertically. The horizontal alignments extend west to east from CMS and Security Square Mall to Bayview. The vertical alignments include surface, varying lengths of tunnel and aerial structures at the east end of the corridor. These alignments are shown in Figure 8 and listed below by geographic area.

GEOGRAPHIC AREA 1
Along Security Boulevard to the north side or south side of the mall or continuing along Security Boulevard.

GEOGRAPHIC AREA 2
Continuing along Security Boulevard or along the central alignment to the I-70 East Park-and-Ride and Cooks Lane at US 40.

GEOGRAPHIC AREAS 3 & 4
The alignments continue along US 40 at the surface or in a tunnel.

GEOGRAPHIC AREA 5
There are three surface alignments under consideration in this geographic area: along US 40 in the lower level, Franklin Street or Mulberry Street. It would then continue along Martin Luther King Boulevard on surface or in a tunnel. There are two tunnel alignments (with several portal locations) also under consideration in this area: under Fremont Avenue or under Martin Luther King Boulevard.

GEOGRAPHIC AREA 6
The alignments in this geographic area continue from Martin Luther King Boulevard through downtown on surface alignments along Baltimore and Lombard Streets to Central Avenue or after Market Place there are surface alignments along Piers 5 and 6 to alignments on Eastern Avenue and Fleet Street. There are tunnel alignments also under consideration through downtown under Lombard or Fayette Streets to Central Avenue or the tunnel could continue to the south and east under Eastern Avenue.

GEOGRAPHIC AREA 7
Along Central Avenue there are surface alignments to Eastern/Fleet or Fleet/Aliceanna couplets. The alignments then continue east or west along either of these surface couplets or in a tunnel alignment under Eastern Avenue.

GEOGRAPHIC AREA 8
At Chester Street, the surface alignments would either continue along the Eastern/Fleet couplet or continue along Boston Street. There are three tunnel alignments in this geographic area, two of the three are unique to Alternative 4: LRT. The tunnel alignment under Eastern Avenue is under consideration for Alternative 4 as well as 3. Unique to Alternative 4, a tunnel alignment under Fleet and Aliceanna Streets to a portal on Aliceanna Street, or this tunnel alignment would continue to the south and east to a portal on Boston Street.

GEOGRAPHIC AREA 9
From Conkling Street to just east of Haven Street, the surface alignments continue from either Boston Street or Eastern Avenue. The Eastern Avenue tunnel alignment would portal near Haven Street. There is only one surface alignment to the terminus of the study at Bayview. The surface alignment would be on new right-of-way following this general alignment: along the Norfolk Southern railroad to an aerial structure over active freight rail lines. The alignment transitions back to grade along the west side of I-895, continuing under I-895 to an alignment on new right-of-way to Bayview Medical Center.

Along all the alignments under consideration, there are different approaches to how the BRT would operate; these operational approaches are called options. Options under consideration include whether the transit would operate in a shared or dedicated lane with vehicular traffic, or whether introducing transit onto a street results in the removal of a parking lane. The location and operational details for the options for Alternative 4: LRT are presented in Table 7. This table briefly describes the options by geographic area.

FIGURE 8- ALTERNATIVE 4: LIGHT RAIL TRANSIT

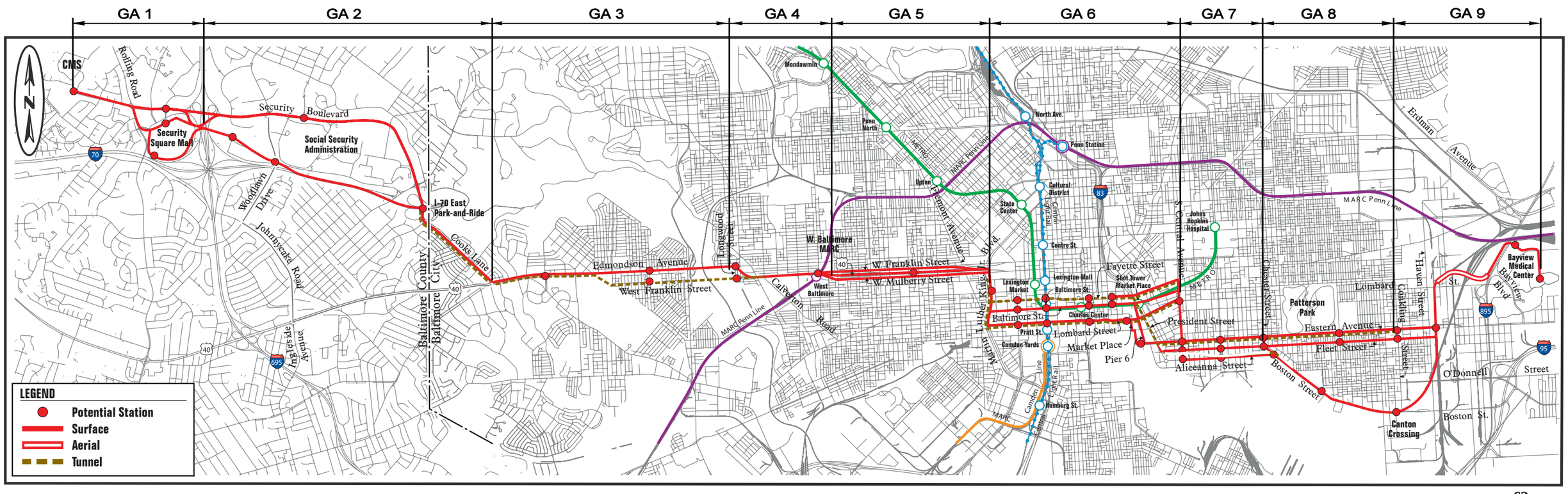


Table 7: Alternative 4, Light Rail -- Options

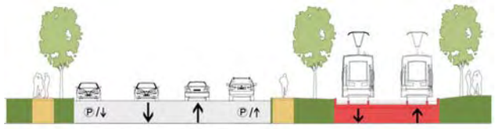
GA	Subarea	Surface or Tunnel	Option Description	Typical Section (Figure 9)	Appendix LOD PAGES
1	Security Boulevard from CMS to Rolling Road	Surface	Dedicated transit on south side of Security Boulevard	TS1	GA 1: 1-2
	Security Square Mall Area from Rolling Road to I-695	Surface	Dedicated transit on south side of Security Boulevard	TS1	GA 1: 3-5
		Surface	Dedicated transit on west side of Rolling Road, dedicated transit on north side of mall	Rolling Road – TS1; N Side of Mall – TS2	GA 1: 9-16
		Surface	Dedicated transit on west side of Rolling Road, dedicated transit on south side of mall	Rolling Road – TS1; S Side of Mall – TS3	GA 1: 17-26
2	I-695 Area from I-695 to Woodlawn Drive	Surface	Dedicated transit on south side of Security Boulevard	TS1	GA 2: 1-4
		Surface	Dedicated transit on the central alignment between I-70 and Security Boulevard	TS3	GA 2: 5-7
	Social Security Administration Area from Woodlawn Drive to I-70 East Park-and-Ride	Surface	Dedicated transit on south side of Security Boulevard, 2 traffic lanes eastbound, 3 traffic lanes westbound.	TS1	GA 2: 8-13
		Surface	Dedicated transit on north side of I-70	TS3	GA 2: 14-21
	I-70 East Park-and-Ride	Surface	Multiple options for location of surface parking lot including with and without maintenance facility	--	GA 2: 22-27
	Cooks Lane from I-70 East Park-and-Ride to US 40	Surface	Dedicated transit in median, one lane of traffic in each direction, full time parking on west side	TS4	GA 2: 28-30
		Surface	Dedicated transit eastbound, one lane of traffic eastbound, shared transit/traffic westbound, full time parking on west side	TS5	GA 2: 31-33
		Surface	Shared transit/traffic lanes in each direction, full time parking on west side	TS6	GA 2: 34-36
		Tunnel	Cooks Lane tunnel	TS7	GA 2: 37-40
3	US 40 from Cooks Lane to Longwood Street	Surface	Dedicated transit in median, 3 traffic lanes peak period, peak direction, no parking; 2 traffic lanes peak period, off-peak direction, one lane of parking	TS8	GA 3: 1-6
		Surface	Dedicated transit in median, 2 traffic lanes in each direction w/ full time parking in curb lane	TS8	GA 3: 7-12
		Tunnel	US 40 and West Franklin Street Tunnel to Calverton Road	TS7	GA 3: 13-19

GA	Subarea	Surface or Tunnel	Option Description	Typical Section (Figure 9)	Appendix LOD PAGES
4	US 40 from Longwood Street to West Baltimore MARC	Surface	Dedicated transit on north side and/or in median of Franklin Street, 3 traffic lanes peak period, peak direction, no parking; 2 traffic lanes peak period, off-peak direction, one lane of parking. Outbound traffic is diverted from Franklin Street to Franklintown Road and Edmondson Avenue.	TS8	GA 4: 1-3
		Surface	Dedicated transit on north side of Franklin Street, 3 traffic lanes eastbound, 1 traffic lane westbound, full time parking in westbound curb lane. On Edmondson Avenue, 3 traffic lanes westbound peak period, peak direction, no parking; 2 traffic lanes westbound peak period, off-peak direction, one lane of parking; 1 traffic lane eastbound, full time parking in eastbound curb lane.	TS8	GA 4: 4-6
		Surface	Dedicated transit in median, 2 traffic lanes in each direction w/ full time parking in curb lane	TS8	GA 4: 7-9
		Tunnel	US 40 and West Franklin Street Tunnel to Calverton Road	TS7	GA 4: 10-11
5	Franklin/US 40/Mulberry from W. Baltimore MARC to Martin Luther King, Jr. Boulevard	Surface	Dedicated transit in median of US 40, 2 traffic lanes in each direction	TS8	GA 5: 10-13
		Surface	Dedicated transit on south side of Franklin Street	TS1	GA 5: 14-17
		Surface	Dedicated transit on north side of Mulberry Street	TS1	GA 5: 18-21
	Martin Luther King, Jr. Boulevard from US 40 to Lombard Street	Surface	Dedicated transit on west side of Martin Luther King, Jr. Boulevard	TS1	GA 5: 22-23
		Tunnel	Fremont Avenue tunnel	TS7	GA 6: 25-26
		Tunnel	Martin Luther King, Jr. Boulevard tunnel with various portal locations	TS7	GA 6: 28-29 & 50-53
6	Fayette/Baltimore/ Lombard from Martin Luther King, Jr. Boulevard to Market Place	Surface	Dedicated transit in second lane out on Baltimore Street-Lombard Street couplet. On Baltimore, 2 eastbound traffic lanes, 1 parking lane right curb full time. On Lombard, 3-5 westbound traffic lanes, 1 parking lane right curb full time.	TS9	GA 6: 2-5
		Surface	Dedicated transit curbside on Baltimore Street-Lombard Street couplet. On Baltimore, 2 eastbound traffic lanes, 1 parking lane left curb full time. On Lombard, 3-5 westbound traffic lanes, no parking on either curb.	TS10	GA 6:1
		Surface	Dedicated transit (two-way) on north side of Baltimore Street, 1 traffic lane eastbound, intermittent parking in right curb lane	TS11	GA 6: 6-9
		Tunnel	Fayette Street tunnel	TS7	GA 6: 23, 25-38
		Tunnel	Lombard Street tunnel	TS7	GA 6: 24, 50-53

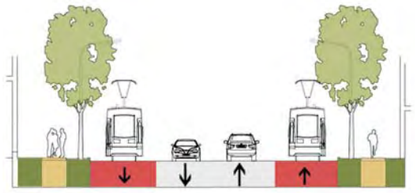
GA	Subarea	Surface or Tunnel	Option Description	Typical Section (Figure 9)	Appendix LOD PAGES
6	Baltimore/ Lombard/ Central/ Pier 5/6 from Market Place to Central Avenue at Aliceanna Street	Surface	Dedicated transit in second lane out on Baltimore Street-Lombard Street couplet to Central Avenue. On Baltimore, 2 eastbound traffic lanes, 1 parking lane right curb full time. On Lombard, 1-3 westbound traffic lanes, 1 parking lane right curb full time.	TS9	GA 6: 11-12
		Surface	Dedicated transit on Baltimore Street-Lombard Street couplet to Central Avenue. On Baltimore, eastbound transit curbside, 2 eastbound traffic lanes, 1 parking lane left curb full time. On Lombard, westbound transit second lane out, 1-3 westbound traffic lanes, no parking on left curb.	Baltimore – TS10; Lombard – TS9	GA 6: 10
		Surface	Dedicated transit (two-way) on north side of Baltimore Street to Central Avenue 1 traffic lane eastbound, intermittent parking in right curb lane	TS11	GA 6: 13-14
		Tunnel	Fayette Street tunnel with various portal locations to Central Avenue	TS7	GA 6: 30-35
		Tunnel	Lombard Street tunnel with various portal locations to Central Avenue	TS7	GA 6: 54-60
		Tunnel	Fayette Street tunnel, continuing to Eastern Avenue tunnel	TS7	GA 6: 36-38
		Tunnel	Lombard Street tunnel, continuing to Eastern Avenue tunnel	TS7	GA 6: 39-47
		Surface	From Market Place to President Street, dedicated transit curbside W. Falls Avenue-Harbor Magic Way Couplet to Eastern-Fleet couplet.	TS10	GA 6: 19-21
		Surface	Dedicated transit second lane out on Central Avenue, 1 traffic lane in each direction with center left turn lane, 1 parking lane on each right curb full time.	TS12	GA 6: 22
		Surface	Dedicated transit in median on Central Avenue, 1 traffic lane in each direction, 1 parking lane on each right curb full time.	TS8	GA 6: 17-18
		Surface	Dedicated transit second lane out Eastern-Fleet couplet, one-way traffic on Eastern-Fleet, w/ 2 traffic lanes peak direction, right curb parking full-time; 1 traffic lane off-peak direction, parking both curbs	TS9	GA 6: 22
		Surface	Dedicated transit second lane out Eastern-Fleet Couplet, one-way traffic on Eastern-Fleet w/ 1 traffic lane, full-time parking both curbs	TS9	GA 6: 19
		Surface	Dedicated transit second lane out Eastern-Fleet Couplet, two-way traffic on Eastern-Fleet w/ 1 lane in each direction, full time parking right curb only	TS13	GA 6: 19

GA	Subarea	Surface or Tunnel	Option Description	Typical Section (Figure 9)	Appendix LOD PAGES
7	Eastern/Fleet/ Aliceanna Streets from Central Avenue to Chester Street	Surface	Dedicated transit second lane out Eastern-Fleet couplet, one-way traffic on Eastern-Fleet, w/ 2 traffic lanes peak direction, right curb parking full-time; 1 traffic lane off-peak direction, parking both curbs	TS9	GA 7: 1-4
		Surface	Dedicated transit second lane out Eastern-Fleet Couplet, one-way traffic on Eastern-Fleet w/ 1 traffic lane, full-time parking both curbs	TS9	GA 7: 1
		Surface	Dedicated transit second lane out Eastern-Fleet Couplet, two-way traffic on Eastern-Fleet w/ 1 lane in each direction, full time parking right curb only	TS13	GA 7: 1
		Surface	Dedicated transit second lane out Fleet-Aliceanna couplet, one-way traffic on Fleet-Aliceanna w/ 2 traffic lanes peak direction, right curb parking full-time; 1 traffic lane off-peak direction, parking both curbs	TS9	GA 7: 5-8
		Surface	Dedicated transit second lane out Fleet-Aliceanna Couplet, one-way traffic on Fleet-Aliceanna w/ 1 traffic lane, full-time parking both curbs	TS9	GA 7: 5
		Surface	Dedicated transit second lane out Fleet-Aliceanna Couplet, two-way traffic on Fleet-Aliceanna w/ 1 lane in each direction, full time parking right curb only	TS13	GA 7: 5
		Tunnel	Eastern Avenue tunnel	TS7	GA 6: 36-47 & 61-64
8	Eastern/Fleet/ Boston Streets from Chester Street to Conkling Street	Surface	Dedicated transit second lane out Eastern-Fleet couplet, one-way traffic on Eastern-Fleet, w/ 2 traffic lanes peak direction, right curb parking full-time; 1 traffic lane off-peak direction, parking both curbs	TS9	GA 8: 1-5
		Surface	Dedicated transit second lane out Eastern-Fleet Couplet, one-way traffic on Eastern-Fleet w/ 1 traffic lane, full-time parking both curbs	TS9	GA 8: 1
		Surface	Dedicated transit second lane out Eastern-Fleet Couplet, two-way traffic on Eastern-Fleet w/ 1 lane in each direction, full time parking right curb only	TS13	GA 8: 1
		Surface	Dedicated transit in median of Boston Street, 2 traffic lanes in each direction, full time parking westbound right curb	TS8	GA 8: 7-11
		Surface	Dedicated transit on south side of Boston Street, 1 traffic lane in each direction with continuous left turn lane, full time parking westbound right curb	TS1	GA 8: 12-13
		Tunnel	Aliceanna tunnel	TS7	GA 6: 36-47 & 61-64
		Tunnel	Eastern Avenue tunnel	TS7	GA 6: 64-70

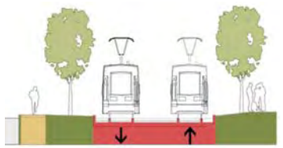
9	Conkling Street to Norfolk Southern/ Canton Railroad	Surface	Dedicated transit second lane out Eastern-Fleet couplet, one-way traffic on Eastern-Fleet, w/ 2 traffic lanes peak direction, right curb parking full-time; 1 traffic lane off-peak direction, parking both curbs	TS10	GA 9: 1-4
		Surface	Dedicated transit second lane out Eastern-Fleet Couplet, one-way traffic on Eastern-Fleet w/ 1 traffic lane, full-time parking both curbs	TS10	GA 9: 1
		Surface	Dedicated transit second lane out Eastern-Fleet Couplet, two-way traffic on Eastern-Fleet w/ 1 lane in each direction, full time parking right curb only	TS14	GA 9: 1
		Tunnel	Eastern Ave. tunnel	TS8	GA 6:36-47 & 61-64
		Surface	From Boston St. and Conkling Street on abandoned N-S railroad right-of-way		GA 9: 10-14
	Norfolk Southern/ Canton Railroad at Eastern Avenue to Bayview MARC Station	Aerial & Surface	At-grade in inactive N-S railroad right-of-way; aerial structure over active N-S railroad to dedicated surface alignment north of Lombard Street on west side of I-895, under I-895		GA 9: 3-6 & 14-16
	Bayview MARC Station to Bayview Medical Center	Surface	Alignment on new right-of-way to Mason Lord Drive, dedicated transit on east side of Mason Lord Drive	TS2	GA 9: 7-9 & 17-19



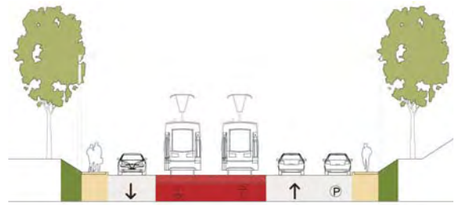
TS1- Transit on New Dedicated Right-of-Way, Adjacent to Roadway



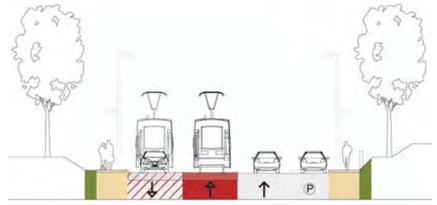
TS2 - Dedicated Curb Lane



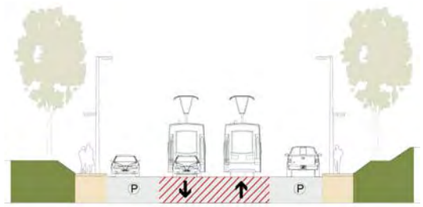
TS3 - Transit on New Dedicated Right-of-Way



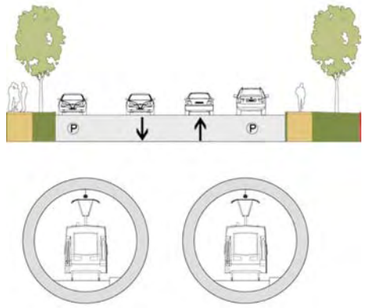
TS4 - Transit in the Median, Parking on One Side



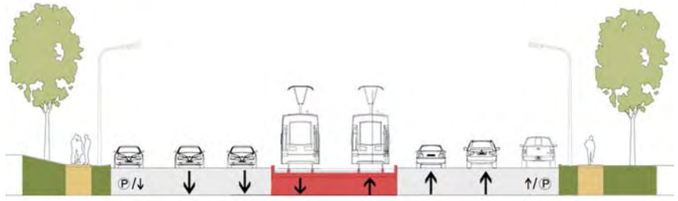
TS5 - 1 Shared Lane, 1 Dedicated Lane, Parking on One Side



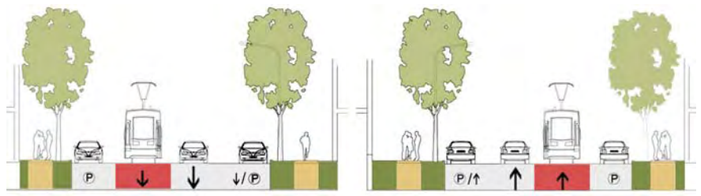
TS6 - Shared Transit / Traffic



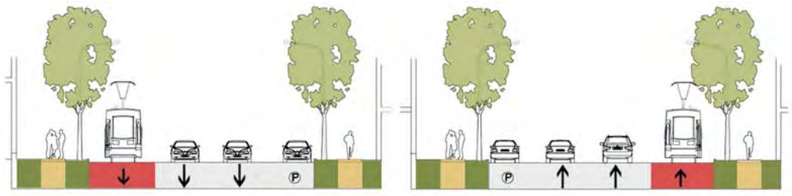
TS7 - Tunnel Under Street



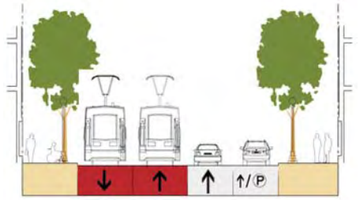
TS8 - Transit in Median



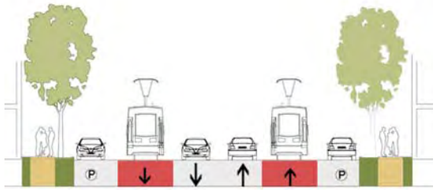
TS9 - Transit Couplet Second Lane Out, 1-Way Traffic



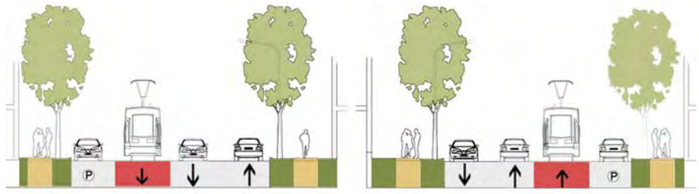
TS10 - Transit Couplet Curbside



TS11- Transit on One Side of Existing Street



TS12 - Transit Second Lane Out



TS13 - Transit Couplet Second Lane Out, 2-Way Traffic

Note:
These typical sections represent the basic design concepts. The proposed number of travel lanes and parking lanes and whether sidewalks are proposed will vary for different streets. See Plans and Profiles for specific information.

FIGURE 9

Alternative 4: Light Rail
Typical Sections for Options

MTA Maryland

Not to Scale

E. ALTERNATIVES ANALYSIS AND NEXT STEPS

1. Representative End-to-End Alternatives

Depending on the transit operation, different options can be combined to create the preferred end-to-end alternative. For the analysis of Alternatives 3 and 4, representative options have been combined to create ten end-to-end alternatives. Other combinations of options may be combined but due to the number of options under consideration, representative options had to be identified to manage the number analyzed. The representative options that make up the end-to-end alternatives are presented and evaluated in Chapter 5 of the AA/DEIS. The 13 end-to-end alternatives are:

- Alternative 1 – No Build
- Alternative 2 – TSM
- Alternative 3 – BRT
  - Alternative 3A - dedicated surface
  - Alternative 3B – dedicated surface + downtown tunnel
  - Alternative 3C – dedicated surface + downtown tunnel + Cooks Lane tunnel
  - Alternative 3D – dedicated surface + maximum tunnel
  - Alternative 3E – dedicated surface with Johnnycake alignment
  - Alternative 3F – BRT, shared and dedicated surface + downtown tunnel
- Alternative 4 - LRT
  - Alternative 4A – LRT, dedicated surface
  - Alternative 4B – LRT, dedicated surface + downtown tunnel
  - Alternative 4C – LRT, dedicated surface + downtown tunnel + Cooks Lane tunnel
  - Alternative 4D – LRT, dedicated surface + maximum tunnel

2. Alternatives Analysis

For each end-to-end alternative, forecasts are prepared to estimate the number of passengers, the cost to build and operate it, and an assessment of the various community and environmental impacts. Most of these evaluations are quantitative and are based on widely accepted practices. In some cases, qualitative evaluations are performed based on professional judgment and experience.

In addition to the technical analysis, public, community, and environmental agency input on the alternatives and options are compared and evaluated. With all of this collective input and technical analysis, the relative benefit of each alternative is then weighed against its cost and impact. Refer to Chapter 6 of the AA/DEIS for the Alternatives Analysis.

3. Next Steps

The comparisons and evaluations of all the options and end-to-end alternatives are fully documented in the AA/DEIS. This document will be made available to public and

approximately one month later. Written comments on the DEIS and comments made at the public hearing are factored in before a Locally Preferred Alternative is selected.

After all comments are received, the Locally Preferred Alternative will be determined and a Request to Initiate Preliminary Engineering will be submitted to the Federal Transit Administration (FTA). This is a key initial step in applying for federal funding for the Red Line.

Further design on the Locally Preferred Alternative will be performed in response to public comments and concerns and to avoid, minimize or mitigate for impacts. The Final Environmental Impact Statement (FEIS) documents this further analysis and better defines the Red Line. The FEIS will contain DEIS and public hearing comments and the documented justification for the preferred alternative. After the FEIS is published and distributed, a Record of Decision is issued. As its name implies, the Record of Decision is the official document specifying what has been selected for final design. It is anticipated that the Record of Decision for the Red Line will be issued by the end of 2010. This will end the planning and preliminary engineering phase of the Red Line.

After the planning phase comes the design phase in which all specifics will be defined. This is done to a much greater detail then during the planning phase because it will form the basis for all construction bids. Presently the schedule anticipates that design for the Red Line will be completed approximately two years after the planning phase (when the Record of Decision is issued). For the Red Line, construction should start within three to six months after bids are accepted.